IMPLICATIONS OF CAPITAL ACCOUNT CONVERTIBILITY AND EXCHANGE RATE MANAGEMENT FOR INDIAN COMPANIES

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ABSTRACT

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ABSTRACT

Introduction

In the current international economic set-up where countries progress towards globalization, private foreign capital is indispensable and caters to the large requirement of capital for development.

Capital Account Convertibility facilitates free inflow of capital as investors have the freedom to take money out whenever they want it without government restrictions and control.

India embarked upon liberalization of the current account and the capital account after experiencing a major Balance of Payment crisis in 1990-91. A host of factors including domestic political crises and increase in oil prices contributed to the decline in the rupee value. India's credit rating was downgraded twice (with the second downgrade placing the country in the "speculative grade") and with instalment payments against some foreign loans coming due, the economy nearly collapsed.

Meanwhile, in 1991, a new government was sworn in and the rupee was devalued (in two quick steps) by a total of 22 percent. Simultaneously, dramatic changes were made in trade policy; the negative list for imports was significantly shortened and a new instrument (the Exim scrip) created to provide exporters with additional returns. Thus began the process of economic liberalization. This was clearly the first step towards the supposed market-determination of the rupee exchange rate.

In the Union budget for 1992-93, the rupee was made "partly convertible", or more correctly, partly floating, thus ushering in the Liberalised Exchange Rate

Management System (LERMS). Under the new scheme, 40 percent of the export receipts (denominated in dollars) was to be surrendered to the RBI at a predefined (official) rate; the proceeds would be used for import of "essential" items (such as petroleum, fertilizers and edible oils). The balance 60 percent could be sold in the "free market" to importers.

Beginning December 1992, ostensibly in acknowledgement of the dollar's sharp gains overseas (which had rendered exports in non-dollar currencies much less profitable), the RBI signalled a change in policy by lowering (devaluing) its official rate. The market knee-jerked to the sudden move and the rupee slipped immediately. A political crisis at home only aggravated the situation and there was a steady decline in dollar inflows; by February 1993, the rupee was falling fast. Finally, in the Union budget for 1993-94, "full float" of the rupee was allowed.

In 1993-94, India shifted towards a "market determined exchange rate", where the exchange rate was determined on the basis of the market and not administratively determined. The economic reforms initiated by the Government of India led to a surge in capital inflows into the country from 1993. At this time, RBI chose to intervene to prevent a rupee appreciation and maintained a fixed parity currency regime at Rs.31.37 per US dollar for nearly two and half years. This led to reserve accumulation and growth in money supply. RBI chose to engage in monetary tightening to bring down the money multiplier to contain growth in money supply.

In his Budget speech for 1997 – 98, the Union Finance Minister, Shri P. Chidambaram, indicated that the regulations governing foreign exchange transactions needed to be modernized and he felt the time had come for preparatory work towards capital account convertibility. This led to the setting up of the Tarapore Committee to recommend measures that should be taken to achieve full capital account convertibility and to specify the sequence and time frame in which such measures were to be taken. The Committee in its recommendations gave a set of pre-conditions to be fulfilled in a phased manner from 1997 – 98.

With liberalization, a need was felt to remove the drastic measures of the Foreign Exchange Regulations Act (FERA) of 1973 and replace them by a set of liberal foreign exchange management regulations. Therefore from 1st June 2000, the Foreign Exchange Management Act (FEMA) was enacted.

FEMA simplified the regulatory regime for foreign-exchange transactions and liberalized capital-account transactions. It also appointed the RBI as the sole monitor of all capital-account transactions. The Act put all foreign-exchange offences under the purview of civil law (these were criminal offences under FERA), thus subjecting them only to monetary penalties. FEMA dictates, among other things, the conditions for Indians holding foreign currency and immovable property outside India (or vice versa) and rules for exporters.

India has completed the first step towards full float of the Rupee by allowing foreign direct investment and institutional investors to bring in and take out money from the country. The second stage of allowing companies and individuals to borrow and invest in foreign exchange has been initiated but not completed in full.

For more than five decades, the Rupee had been steadily depreciating from the level of Rs. 2.40 per dollar prior to 1947 to Rs. 49.07 in June 2002. From July 2002 onwards the rupee appreciated to Rs.43.40 per US dollar as of March 2004. From April 2004, the Rupee has again started depreciating against the US dollar and reached a level of Rs. 46.16 end of September 2004. On 7th December 2004 it reached a level of Rs.43.70. The recent trend shows a lot of volatility in the exchange rates of the Rupee against the US Dollar.

Importance of the Study

Based on the information given above, it is obvious that Capital Account Convertibility has received the attention of policy makers in India ever since we embarked on liberalization. Various studies have aimed at examining the importance of capital account convertibility and its associated macroeconomic factors in terms of its Influence on exchange rates. In the first part of this study, the major macroeconomic factors affecting the Rupee - US dollar

exchange rates are identified. In the second part of the study, forecasting of exchange rate of the Rupee against the Dollar based on statistical models, which will treat exchange rate as a function of a number of important macroeconomic factors is attempted. In the third part of the study, a survey is conducted on the foreign exchange risk management practices of Indian companies and the exchange rate forecasting models are used to help companies manage their foreign exchange exposure.

Arrangement of Chapters

CHAPTER – 1: Introduction

This chapter deals with what is capital account convertibility and convertibility concepts on current account and capital account. Then, the benefits of capital account convertibility are discussed. This chapter also covers pitfalls of capital account convertibility based on international experience. Pre-conditions for capital account convertibility are also discussed.

CHAPTER – 2: The evolution of India's exchange rate from the pre-Bretton Woods period up to the current position is highlighted in this chapter.

This chapter discusses the pre-Bretton Woods exchange rates system in India, why the Bretton Woods system broke down, the early years of floating rates, the movement towards a basket-linked exchange rate system, the macroeconomic crisis of 1990-91 and the steps taken towards current account convertibility and capital account convertibility. Foreign exchange regulation aspects and the changes from FERA to FEMA are also discussed.

CHAPTER – 3: This chapter concentrates on literature survey and research methodology. After studying the existing literature on capital account convertibility, exchange rate management and currency risk management for companies, the gap in the research literature has been identified. Based on this, the objectives and hypothesis of the study have been laid down. The primary as well as the secondary data have been collected and the sources of data, their definition and the methodology of analysis of collected data have

been explained in this chapter. The limitations of the study are also highlighted in this chapter.

CHAPTER – 4: The recommendations of the Tarapore Committee on Capital Account Convertibility, the pre-conditions stipulated by the Committee and the various signposts laid down in the report are discussed in this chapter. The timing and sequencing of various measures and their current status as of September 2004 are also discussed. Based on the above discussion, the various factors affecting exchange rates are identified.

CHAPTER – 5: In this chapter, the daily exchange rates for the Rupee and the US Dollar for the period January 1973 to November 2004 are studied. The exchange rates have followed a linear depreciating path from January 1973 to June 2002. From July 2002 to November 2004, the exchange rates have turned volatile. Using simulation, the volatility in the exchange rates is demonstrated and the risk of leaving open the foreign currency exposure of companies is highlighted. This leads to the need for forecasting exchange rates for the Indian companies and taking appropriate risk cover through hedging tools like forwards, options and swaps available now in India.

Further, this chapter concentrates on examining the relationship between selected macroeconomic factors and exchange rate of the Rupee against the Dollar. These variables have been identified based on the literature review done by us and also based on the recommendations of the Tarapore Committee on Capital Account Convertibility.

An exchange rate forecasting model is built based on the exchange rate (dependent variable) and nine other macroeconomic variables (independent variables) for the years 1991 to 2004.

Univariate analysis and multivariate analysis are used to find out the correlation between the variables and the extent of dependency of the exchange rate on the nine independent variables.

Time series regression analysis, exponential smoothing method and moving average method are also used for forecasting the exchange rate of the Rupee against the Dollar using the data from January 1973 to November 2004.

CHAPTER – 6: This chapter deals with exchange rate risk management by Indian companies, based on primary data collected from the executives who are dealing with foreign exchange in their companies, through a questionnaire. The opinions of regulators and bankers have also been considered, based on personal interviews. A couple of case studies have also been used for this purpose. The questionnaire data has been analyzed and conclusions drawn.

CHAPTER 7: This being the last chapter of the thesis, it deals with the summary, conclusions and recommendations. Guidance for future research has also been put forward.

Research Gap

From the literature review on Capital Account Liberalization, exchange rate management and corporate risk management, it is clear that various studies have been made but the direction of these studies lack the following:

(i) Sequencing of Capital Account Convertibility and the pre- conditions required for Capital Account Convertibility in India.

(ii) Identification of various macroeconomic factors affecting exchange rate of the Rupee against the Dollar and the relationship of these factors with the exchange rates.

(iii) Exchange rate forecasting based on non-linear statistical models.

(iv) Survey of Indian companies for studying their foreign exchange risk management practices.

Justification for the study

Under the present condition of available literature and the gap in the existing studies, there is a need to have a detailed study, which should incorporate the sequencing of capital account convertibility and the pre-conditions required for capital account convertibility in India. There is a close link between capital account convertibility and the various macroeconomic factors affecting the exchange rate of the Rupee against the Dollar. The study aims to identify the macroeconomic factors affecting the exchange rates and the relationship between them. Further, there is a need to look into the recent volatility in the exchange rate of the Rupee against the Dollar. Exchange rate forecasting is attempted based on statistical models using the identified macroeconomic factors. There is a need to look into the foreign currency risk management practices of the Indian companies, which will help the companies manage their foreign currency risk in a better manner. Based on primary data collection through questionnaire survey, the study aims to help companies by suggesting measures for improving their foreign currency risk management.

Objectives of the Study

(1) To study the recommendations of the Tarapore Committee for Capital Account Convertibility, it's sequencing and the present status of implementation in India to identify macroeconomic factors affecting the exchange rate of the Rupee against the Dollar.

(2) To examine the recent volatility in exchange rates and to demonstrate its continuance based on simulation.

(3) To establish a relationship between Macroeconomic factors and Exchange rates for forecasting the Rupee-Dollar Exchange Rate.

(4) To study the foreign currency exposure risk management of selected Indian companies through a survey and interview.

(5) To suggest measures for handling foreign exchange exposure for Indian companies.

Scope of the Study

1) While studying the macroeconomic factors affecting the exchange rates, the study limits itself to the data for the period 1991 to 2004.

2) The study is confined to Rupee-Dollar only.

3) The companies covered are predominantly Chennai-based companies having exposure to foreign exchange on account of imports, exports or foreign currency loans.

Data Sources and Collection

Primary data from the corporates and secondary data from the handbook of statistics on the Indian economy, Reserve Bank of India, annual report of the Reserve Bank of India, the website of Reserve Bank of India viz. www.rbi.org.in, Center for Monitoring Indian Economy and the Federal Reserve Statistical Release of the US government are used for the study. The secondary data are very reliable and sound. Primary data collection was made through questionnaire survey on Chennai-based companies. The views of experts/knowledgeable people in the foreign exchange field namely Chief Financial Officers of companies, bankers and regulators with respect to foreign exchange risk management for Indian companies are also obtained through personal interviews.

Methodology

(a) Monte Carlo Simulation to demonstrate the volatility in exchange rates

The daily exchange rates of the Rupee against Dollar from January 1973 to November 2004 were studied to understand the behaviour of

the exchange rates. The exchange rates have steadily depreciated from 1947 to June 2002. From July 2002, the rupee has turned volatile. Using Monte Carlo simulation the volatility of exchange rates is studied. The Monte Carlo simulation technique is a well-known technique that uses random numbers generated from a uniform distribution and maps the relative frequency to the random numbers generated. Each time when a random number corresponds to a specific relative frequency, the exchange rate that is associated with that category is taken as the prediction for the next period. Monte Carlo simulation method is equally applicable when random numbers are generated from a standard probability distribution such as the normal distribution. In this case, the cumulative probability of the standard normal distribution is taken as the basis for predicting the exchange rate.

(b) Exchange Rate Forecasting

The forecasting of the exchange rate of the Rupee against the Dollar using a forecasting model based on multivariate regression analysis is attempted. Macroeconomic data from 1991 to 2004 have been used for this purpose. For the empirical analysis of exchange rates (the dependent variable) and nine other macroeconomic variables (independent variables) for the years 1991 to 2004, the univariate and multivariate regression analysis are used. The data analysis and results are discussed in the chapter-5 on exchange rate volatility and it's forecasting.

(c) Primary data collection through questionnaire survey

125 Chennai-based companies were identified, which had exposure to foreign exchange on account of imports, exports or foreign currency loans from the database of Center for Monitoring Indian Economy. Structured questionnaires were sent to the Chief Financial Officers of these companies. 54 responses were received and the analysis of the above is covered in Chapter-6, Implications of Exchange Rate Management for Indian Companies. The Statistical Package for Social Sciences (SPSS) was used for the above analysis.

The macroeconomic variables selected for data analysis are: -

(1) Exchange Rate
(2) Bank Rate
(3) Balance of Payments
(4) External Debt
(5) Foreign Direct Investment and Foreign Institutional Investment in India
(6) Foreign Exchange Reserves
(7) Gross Domestic Product
(8) Fiscal Deficit
(9) Inflation
(10) US Federal Interest Rate

Hypothesis Development

Hypothesis 1: **Bank Rate and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between bank rate and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the bank rate and exchange rate of the Rupee against the Dollar.

Hypothesis 2: **Balance of Payments and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Balance of Payments and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Balance of Payments and exchange rate of the Rupee against the Dollar.

Hypothesis 3: **External Debt and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the External Debt and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the External Debt and exchange rate of the Rupee against the Dollar.

Hypothesis 4: **FDI and FII and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the FDI and FII inflows and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the FDI and FII inflows and exchange rate of the Rupee against the Dollar.

Hypothesis 5: **Foreign Exchange Reserves and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Foreign Exchange Reserves and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Foreign Exchange Reserves and exchange rate of the Rupee against the Dollar.

Hypothesis 6: **Gross Domestic Product and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Gross Domestic Product and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Gross Domestic Product and exchange rate of the Rupee against the Dollar

Hypothesis 7: **Fiscal Deficit and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Fiscal Deficit and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Fiscal Deficit and exchange rate of the Rupee against the Dollar

Hypothesis 8: **Inflation (Based on CPI) and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Inflation (Based on CPI) and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Inflation (Based on CPI) and exchange rate of the Rupee against the Dollar

Hypothesis 9: **US Federal Interest Rate and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the US Federal Interest Rate and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the US Federal Interest Rate and exchange rate of the Rupee against the Dollar

Limitations of the study

(i) Predominantly Chennai based companies only were considered in our sample

(ii) Only the Rupee against Dollar exchange rates has been taken for the study.

(iii) The macroeconomic data are limited to the period 1991-2004.

(iv) Political factors and speculation have not been considered in the study. These factors have shown influence on exchange rates from time to time.

(v) The companies who have responded are very limited in numbers and do not represent all the sectors of the economy.

Summary and Conclusions of the Study

The conclusion of the study and the recommendations that are put-forward are presented here. For this purpose, the following scheme of presentation of this chapter has been adopted:

(i) Conclusions related with the recommendations of Tarapore Committee on Capital Account Convertibility, its sequencing and present status of implementation in India.

(ii) Identification of macroeconomic factors affecting the exchange rate of the Rupee against the Dollar.

(iii) Exchange rate volatility and its forecasting

(iv) Implications of exchange rate management for Indian companies

Summary of major pre-Conditions of Tarapore Committee and the current position as of November 2004

1. Gross fiscal deficit to GDP ratio to come down from a budgeted 4.5% in 1997-98 to 3.5% in 1999-2000. In November 2004, it was still at 5%.

2. A consolidated sinking fund has to be set up to meet the Government's debt repayment needs; to be financed by the increases in RBI's profit transfer to the Government and disinvestments proceeds. As of now, it is not yet done. Fiscal Responsibility Act, 2003 has been passed to reduce government's borrowings.

3. Transparent and globally comparable procedures for fiscal accounting need to be implemented.

4. Inflation rate should remain between an average 3.5% for the three-year period 1997-2000. It was around 7.5% in November 2004.

5. Gross NPAs of the public sector banking system needs to be brought down from the present 13.7% to 5% by 2000 and at the same time, average effective CRR needs to be brought down from the 10% level to 3% level. The Gross NPAs to advances of public sector banks as of 2003 are at 9.4% and Gross NPAs to total assets of the public sector banks are at 4.2%. The net NPAs to total advances of public sector banks as of 2003 are at 4.5% and net NPAs to total assets of the public sector banks are at 1.9% (RBI Annual Report, 2003).

6. RBI should have a Monitoring Exchange Rate Band of plus/minus 5% around a neutral Real Effective Exchange Rate. RBI should be transparent about the changes in REER. Currently, RBI is tracking the

REER, but it does not have any target rate in mind or any band within which the rates should move.

7. External sector policies should be designed to increase current receipts to GDP ratio and bring down the debt-servicing ratio from 25% to 20%. This has been achieved. Current receipts to GDP ratio is 18.7% and debt service ratio is at 14.7%.

8. Indicators should be used for evaluating adequacy of foreign exchange reserves to safeguard against any contingency. Plus law should prescribe a minimum net foreign asset to currency ratio of 40%. Currently, our foreign exchange reserves are about $126 billion as of November 2004 and they are quite adequate. Foreign asset to currency ratio is more than adequate at 130%.

Identification of Macroeconomic Factors affecting Exchange Rates

The Management of the external sector has been one of the success stories of India in the last decade. The country has completed the first step towards full-float of the Rupee by allowing Foreign Direct Investment and Foreign Institutional Investment and the investors can bring in and take out money from the country. The second stage of allowing companies and individuals to borrow and invest in Foreign Exchange has been initiated but not completed in full. The country has comfortable Foreign Exchange Reserves (126 billion Dollars as of November 2004) and a healthy Balance of Payments situation.

India needs to bring down the gross fiscal deficit to GDP Ratio from the present 5% to 3.5%. Inflation should be contained from the current 7.5% to 3.5%. GDP should grow consistently at a growth ratio of 8% to 10%. If the above are achieved, India will be ready for full convertibility of the capital account. Based on the recommendations made by the Tarapore Committee and the analysis made, the following 9 factors, which are very important for capital account convertibility and which have influence on the exchange rate of the Rupee against the Dollar are identified as the Balance of Payments

position, Inflation, Bank rate, Fiscal deficit, Gross Domestic Product, Foreign Exchange Reserves, External Debt, Foreign Direct Investment and Foreign Institutional Investment and US Federal Interest Rate.

Exchange rate volatility

The daily exchange rates of the Rupee against the US Dollar from January 1973 to November 2004 were studied and it was found that the Rupee exchange rates have followed a linear depreciating trend from 1973 to June 2002. From July 2002, they have turned volatile. Monte Carlo simulation results show that the exchange rate of the Rupee against the Dollar is volatile and the rate is most likely to be in the range of Rs.44 per Dollar to Rs.47 per Dollar for the year ending March 2005.

Forecasting of Exchange Rate

1. The relationship between the exchange rate of the Rupee against the Dollar and the nine-macroeconomic variables identified on Capital Account Convertibility has been studied. The univariate analysis rejected the null hypothesis for eight out of nine variables. Hence, it was found that there is a relationship between bank rate, balance of payment, external debt, FDI and FII, Foreign Exchange Reserves, GDP, Gross Fiscal Deficit, Inflation and the exchange rate of the Rupee against the Dollar. Only in the case of US Federal Interest Rate and the Exchange Rate of the Rupee against the Dollar, the null hypothesis of no linear relationship between the two variables is accepted at 5% level of significance. However, it is significant at 8.55% level based on the "P" value given in the summary output. In other words, if we increase the level of significance to 8.55% then the null hypothesis is rejected and there is a relationship between the exchange rate of the Rupee against the Dollar and the US Federal Interest Rate.

2. Multivariate analysis has been used for all the nine macroeconomic variables and it was found that there is a very strong linear relationship between the dependent variable (exchange rate of Rupee against

Dollar) and the nine independent variables (bank rate, balance of payment, external debt, FDI and FII, Foreign Exchange Reserves, GDP, Gross Fiscal Deficit, Inflation and US Federal Interest Rate). The statistical validity test ANOVA also overwhelmingly rejects the null hypothesis of no linear relationship between the dependent variable and the set of independent variables already mentioned above. Then six of the significant independent variables have been selected, using the "P" (Probability significance) value. They are external debt, foreign exchange reserves, GDP, US Federal Interest Rate, Bank Rate and Gross Fiscal Deficit. Multivariate analysis using the six significant variables found that the results are equally good and the differences are only marginal in the correlation value, r^2 value and the adjusted r^2 value.

3. The forecast of the exchange rate of the Rupee against the Dollar based on all the nine variables using the above multivariate regression model comes to Rs.44.55 per Dollar for March 2005.

The forecast of the exchange rate of the Rupee against the Dollar based on the six significant variables using the multivariate regression model come to Rs.45.91 per Dollar for March 2005.

The forecast of the exchange rates based on time series regression analysis was made. It was found that this method of forecasting showed a linear depreciating trend even when the Rupee was appreciating and hence we found it to be not reliable.

The forecast of the exchange rates based on exponential smoothing method taking the monthly data and the yearly data was also made and it was found the forecast exchange rate per Dollar to be in the range of Rs.44.10 Per Dollar to Rs.44.17 per Dollar from December 2004 to March 2005.

The forecast of the exchange rate based on the monthly moving average method and the yearly moving average method was made and it is in the range of Rs.44.63 per Dollar to Rs.43.70 per Dollar.

Based on the various techniques of forecasting, the exchange rate of the Rupee against the Dollar is expected to be in the range of Rs.43.70 per Dollar to Rs.45.91 per Dollar during December 2004 to March 2005. The forecast rates vary due to the application of different methods of calculation.

Summary of the questionnaire based survey findings

The survey reports the results of the empirical study into the foreign exchange risk management practices of 54 responding companies. Of the 125 companies that were addressed, a total of 54 responded to the questionnaire. The managers of these companies were asked about the mode of exposure to foreign exchange, about their risk management strategies, the risk management techniques that they were using and their reasons for using the same and if they were not using a particular technique, their reasons for not using the same. The managers were asked to quantify their uncovered exposure. They were also asked how they forecast the exchange rate.

The results can be summarized as follows:

1. Most of the firms (51.9%) had exposure to foreign currency on account of all of imports, exports and foreign currency loans.

2. A sizeable majority of the firms (83.3%) adopted a selective hedging strategy based on case-to-case and time-to-time decisions.

3. Overwhelming majority of the companies (92.6%) did not forecast exchange rates on their own. About 77.8% of the responding companies relied on bankers' opinion and experts' opinion for taking a view on the exchange rates.

4. Only a small minority of firms (5.6%) does not hedge its foreign exchange risks and only a few companies (27.8%) hedge their exposure completely.

5. A majority of the corporate managers (85.2%) feels that the exchange rates will move in the range of Rs.45 to Rs.46.5 per Dollar upto March 2005.

The companies cited the following reasons for using forwards for hedging their foreign exchange exposure:-

(1) Simple and easy to understand
(2) Liquid and available all the time
(3) Transparent
(4) Cost effective
(5) Useful in targeting a budgeted cost

The companies cited the following reasons for using options for hedging their foreign exchange exposure: -

(1) Strike price and premium are attractive
(2) Flexible with room to manoeuvre
(3) Gives right without obligation
(4) Liquid and available

The companies cited the following reasons for not using options for hedging their foreign exchange exposure: -

(1) Option premium is high
(2) Minimum contract size is high
(3) Companies are not yet comfortable with the product
(4) Fear of manipulation
(5) Option quotes favour the banks only
(6) Absence of dynamic quotations

The companies cited the following reasons for using swaps for hedging their foreign exchange exposure: -

(1) Interest rate reduction
(2) Cost effective
(3) Transparent

The companies cited the following reasons for not using swaps for hedging their foreign exchange exposure: -

(1) The international swap dealers association agreement is too confusing
(2) The agreement has irrelevant clauses
(3) It is too lengthy

Summary of the views expressed by Corporate Chief Finance Officers, Bankers and Regulators:

The foreign exchange derivative products that are available in the Indian financial markets are forwards, options and currency swaps.

Rupee forwards

An important segment of the foreign exchange derivatives market in India is the Rupee forward contract. This market is growing rapidly with an increased participation from the corporates and banks. Till February 1992, forward contracts were permitted only against trade related exposures and these contracts could not be cancelled except where the underlying transactions failed to materialize. In March 1992, in order to provide operational freedom to corporates, unrestricted booking and cancellation of forward contracts for all genuine exposures, whether trade related or not, were permitted. Due to the Asian currency crisis, this freedom to rebook the cancelled contracts was suspended in 1998, which has been relaxed for the exporters in 2002 and for importers in 2004.

The liquidity in the Indian forward market has been steadily improving and the bid-offer spread has been decreasing considerably with the increase in turn over in the forward market. The forward market in our country is active only upto 6 months, where two-way quotes are available. With the initiative of RBI, the maturity profile has elongated and quotes are now available upto one year. But the liquidity of this segment needs to improve. Understandably in most markets, where there are restrictions on capital movements, liquidity across the spectrum as seen in the developed markets, proves to be difficult in early stages of development of the market.

The liquidity in the Indian forwards market is mainly for the end of the month maturity contracts, where the bid-offer spread is low. Standard maturity contracts like, for three months and six months, are not quoted in the inter bank markets. Hence, the cost of entering into a standard maturity contract is much higher as compared to a month end contract.

The Indian forward market is relatively illiquid for the standard maturity contracts as most of the contracts are for the month ends only. One of the reasons for the market makers' reluctance to offer these standard contracts could be the absence of a well-developed term money market. The market makers feel that given the future like nature of Indian forward market, currency futures could be allowed. Some of the benefits that may be provided by the futures are as follows: -

a) Currency futures, since they are traded on organized exchanges, also confer benefits from concentrating order flow and providing a transparent venue for price discovery, while over-the-counter forward contracts rely on bilateral negotiations.

b) Two characteristics of futures contract – their minimal margin requirements and low transaction cost relative to the over-the-counter markets strengthen the case for their introduction.

c) Credit risks are further mitigated by daily marking to market of all future positions with gains and losses paid by each participant to the clearinghouse by the end of the trading session.

d) Future contracts are standardized using the same delivery dates and the same nominal amount of currency units to be traded.

Currency options

The Reserve Bank of India has permitted authorized dealers to offer cross currency options and Rupee currency options to the corporate clients. Cross

currency options provide a way of availing of the upside from any currency exposure while being protected from the downside on payment of an upfront premium. The corporates feel the option premium is currently very high and the spread is very wide. Minimum size of the contract is also high at quarter million Dollars. At present, activity in this product is limited as it is in its early stage of introduction. Increased activity in options can result as the corporates start understanding this product better.

Currency swaps

Another spin-off of the financial reforms and liberalization is the introduction of foreign currency to Rupee swaps. Initially, the market was very small and the two-way quotes were very wide. The market started developing as more players as well as corporates started understanding this product and using them to manage their exposures. Corporates started using swaps for hedging their currency exposure and to reduce their borrowing cost. RBI tried to regulate the market by fixing USD 10 million as the limit for open position on the swap book for the authorized dealers. This was raised to USD 25 million and then to USD 50 million. The authorized dealers were also allowed the use of currency swaps to hedge their asset-liability portfolio. These developments are expected to result in increased market activity. The corporates feel the international swap dealers' association agreement, which they have to sign with the Authorized Dealers, at the time of entering into a swap deal, is too confusing, lengthy and has lot of irrelevant clauses. This agreement needs to be made user-friendly for the corporates.

Summary of the cases

Case Study 1: Infosys Technologies Limited has a very good risk management structure. Inspite of their very good risk management framework, the Rupee's sudden depreciation in the quarter ending June 2004 caught them by surprise and they had to change their hedging strategy. Infosys had covered their June quarter end receivables through forward contracts around the March 2004 rate of Rs.43.40 per US Dollar. They had to

book losses on the forward cover by marking to market the forward cover contracts at the rate of Rs.45.99 to the Dollar for the entire position of $228 millions as the Rupee started depreciating from the March, 2004 level of Rs.43.40 to Rs.45.99 by June, 2004.

Case Study 2: Orchid Pharmaceuticals and Chemicals Limited belongs to the risk neutral category and follows a selective hedging approach to their foreign exchange risk management. They entered in to a swap deal on 11th September 2002 with ABN-AMRO Bank for a one-year maturity converting 800 million rupees into US dollars @ Rs.48.52 per dollar at an interest rate of 9.78% when the rupee loan was taken at 12.5% from IDBI. On 23rd May 2003, this deal was closed at a rupee-dollar rate of Rs.47.42. The Rupee interest plus principal repayment was Rs.900,000,000.00. But the actual cash outflow was Rs.871,282,231.38 on account of the swap deal. This deal resulted in a profit of nearly Rs.2.87 crores for Orchid. In September 2003, the rupee reached the level of Rs.46. If Orchid had continued this transaction till September 2003, the expected gain for the company could have been nearly Rs.5.63 crores. This is an opportunity loss for the company.

In both cases, the opportunity loss was due to the inability of the companies to forecast the exchange rates.

Recommendations for the Companies

The study has amply demonstrated the volatility in the exchange rate of the Rupee against the Dollar. From January 1973 to June 2002, the Rupee depreciated steadily from the level of Rs.8.02 to a Dollar to Rs.49.07 to a Dollar. From June 2002, it appreciated steadily till March 2004 to a level of Rs.43.40. From April 2004 again it has started depreciating and reached a level of Rs.46.16 end of September 2004. By end of November 2004, it has again reached a level of Rs.44.75. From 2002 to 2004, there is lot of volatility in the exchange rate movement and the trend is no more unidirectional. This calls for forecasting of exchange rates with emphasis on various factors affecting the exchange rates and continuous monitoring of the exposure. Prior

to the volatile phase in the exchange rates, corporates used to hedge their exposure on imports, interest payments and loan repayments and leave their export receivables un-hedged because of the unidirectional movement of the Rupee-Dollar exchange rates. The current scenario calls for active risk management on the part of the fund managers. They have to make effective use of currency forwards, currency options and swaps. These products are now freely available, thanks to the policy changes announced by the Reserve Bank of India. For effective use of these products, corporates need to forecast the exchange rates based on the macroeconomic factors that affect the rates. Based on the forecasting models and views from the corporate finance heads, bankers and regulators, we have arrived at a range of Rs.43.70 to Rs.45.91 for the Rupee – Dollar exchange rates for the year ending March 2005. Corporates should cover their export receivables at the higher end of the range (Rs.45.91) and cover their payables on account of imports, interest payments and repayment of loans at the lower end of the range (Rs.43.70). They should constantly watch the exchange rate movement and take the above steps when the opportunity presents itself.

Recommendations for the Regulators and the Government

The Indian foreign exchange derivatives market is still in a nascent stage of development but offers tremendous growth potential. The development of a vibrant foreign exchange derivatives market in India would critically depend on the growth in the underlying spot/forward markets, growth in the Rupee derivative markets along with the evolution of a supporting regulatory structure. Factors such as market liquidity, corporate investor behaviour, regulatory structure and tax laws will have a significant bearing on the behaviour of market variables in this market. Increased convertibility on the capital account would accelerate the process of integration of Indian financial markets with international markets. Some of the necessary preconditions to this, as suggested by the Tarapore Committee, are already met. Introduction of derivative products, tailored to specific corporate requirements, would enable corporates to completely focus on their core businesses, de-risking the currency and interest rate risks while allowing them to gain from the financial

markets. Increased convertibility on the Rupee and regulatory impetus for new products should see a host of innovative products and structures tailored to business needs. The possibilities are many and include currency futures, Rupee forward rate agreements, Rupee and cross currency swaptions as well as structures composed of the above to address the needs of corporates. A further development in the derivatives market could also see derivative products linked to commodities, weather etc., which would add great value in an economy where substantial section is still agrarian and dependent on the vagaries of the monsoon.

Direction for future Research

This study has revealed interesting insights into the fascinating world of foreign exchange markets and exchange rate management. This study has taken only two currencies namely; the Rupee and the Dollar. Similar studies can be taken up against other currencies like Euro, Pound and Yen.

(i) With 31 countries adopting Euro as their national currency, it will be interesting to study the Euro – Dollar exchange rate behaviour in the immediate future.

(ii) This study is based on 54 companies, which are predominantly Chennai based. The scope of the study can be enlarged by taking sample Companies on an all India basis.

(iii) Conducting a focus group discussion involving CFOs that would shed light on certain important underlying dimensions can further delineate the study. These dimensions and their ramifications cannot be brought about by one to one discussion with experts because there is no interaction amongst experts. In the focus group discussion, the collective synergy of these experts will give rise to a number of useful hypotheses. These hypotheses could be tested at a macro level by conclusive studies. Needless to mention here that the audience for the

focus group discussion must form a homogenous group and screened before they are invited for the discussion.

(iv) Advanced econometric models of forecasting could be undertaken by making available a large database. These models would include Box and Jenkin (Johnston, 1972; Greene, 2000; Ramu Ramanathan, 2002), ARIMA (Auto Regressive Moving Average) and Adaptive Filtering.

P. GOVINDARAJAN.
15.12.2004

IMPLICATIONS OF CAPITAL ACCOUNT CONVERTIBILITY AND EXCHANGE RATE MANAGEMENT FOR INDIAN COMPANIES

Thesis submitted
for the award of the degree of

DOCTORATE IN BUSINESS ADMINISTRATION

By

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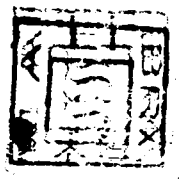

DEPARTMENT OF BUSINESS ADMINISTRATION
FACULTY OF MANAGEMENT STUDIES AND RESEARCH
ALIGARH MUSLIM UNIVERSITY
ALIGARH (UP) INDIA
2004

DECLARATION

I do hereby declare that the thesis titled "**Implications of Capital Account Convertibility and Exchange Rate Management for Indian Companies**" submitted to the Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh for the award of the degree of DOCTORATE IN BUSINESS ADMINISTRATION is the original work carried out by me under the supervision of Dr. Mohammad Khalid Azam, Reader (Internal Advisor), Department of Business Administration, Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh and Prof. Ramaswamy P. Aiyar, (External Supervisor), Chairman, ATMA, Past President, AIMS, Former Director of IIM, Calcutta and IFMR, Chennai and it has not previously formed the basis for the award of any Degree/Diploma/Associateship/Fellowship or similar title to any candidate of any university.

Place: Chennai

Date: 15.12.2004

(P Govindarajan)

CERTIFICATE

This is to certify that the thesis titled "**Implications of Capital Account Convertibility and Exchange Rate Management for Indian Companies**" submitted to the Department of Business Administration, Faculty of Management Studies and Research, Aligarh Muslim University, Aligarh is a record of original research work done by P Govindarajan during the period of his study in the Department of Business Administration, Faculty of Management Studies and Research, Aligarh under my supervision and guidance and that the thesis has not formed the basis for the award of any Degree/Diploma/Associateship/ Fellowship or other similar title to any candidate of any university.

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PREFACE

In the current international economic set-up where countries progress towards globalization, private foreign capital is indispensable and caters to the large requirement of capital for development.

Capital Account Convertibility facilitates free inflow of capital as investors have the freedom to take money out whenever they want it without government restrictions and control.

India embarked upon liberalization of the current account and the capital account after experiencing a major Balance of Payment crisis in 1990-91. A host of factors including domestic political crises and increase in oil prices contributed to the decline in the rupee value. India's credit rating was downgraded twice (with the second downgrade placing the country in the "speculative grade") and with instalment payments against some foreign loans coming due, the economy nearly collapsed.

Meanwhile, in 1991, a new government was sworn in and the rupee was devalued (in two quick steps) by a total of 22 percent. Simultaneously, dramatic changes were made in trade policy; the negative list for imports was significantly shortened and a new instrument (the Exim scrip) created to provide exporters with additional returns. Thus began the process of economic liberalization. This was clearly the first step towards the supposed market-determination of the rupee exchange rate.

In the Union budget for 1992-93, the rupee was made "partly convertible", or more correctly, partly floating, thus ushering in the Liberalised Exchange Rate Management System (LERMS). Under the new scheme, 40 percent of the export receipts (denominated in dollars) was to be surrendered to the RBI at a predefined (official) rate; the proceeds would be used for import of "essential"

items (such as petroleum, fertilizers and edible oils). The balance 60 percent could be sold in the "free market" to importers.

Beginning December 1992, ostensibly in acknowledgement of the dollar's sharp gains overseas (which had rendered exports in non-dollar currencies much less profitable), the RBI signalled a change in policy by lowering (devaluing) its official rate. The market knee-jerked to the sudden move and the rupee slipped immediately. A political crisis at home only aggravated the situation and there was a steady decline in dollar inflows; by February 1993, the rupee was falling fast. Finally, in the Union budget for 1993-94, "full float" of the rupee was allowed.

In 1993-94, India shifted towards a "market determined exchange rate", where the exchange rate was determined on the basis of the market and not administratively determined. The economic reforms initiated by the Government of India led to a surge in capital inflows into the country from 1993. At this time, RBI chose to intervene to prevent a rupee appreciation and maintained a fixed parity currency regime at Rs.31.37 per US dollar for nearly two and half years. This led to reserve accumulation and growth in money supply. RBI chose to engage in monetary tightening to bring down the money multiplier to contain growth in money supply.

In his Budget speech for 1997 – 98, the Union Finance Minister, Shri P. Chidambaram, indicated that the regulations governing foreign exchange transactions needed to be modernized and he felt the time had come for preparatory work towards capital account convertibility. This led to the setting up of the Tarapore Committee to recommend measures that should be taken to achieve full capital account convertibility and to specify the sequence and time frame in which such measures were to be taken. The Committee in its recommendations gave a set of pre-conditions to be fulfilled in a phased manner from 1997 – 98.

With liberalization, a need was felt to remove the drastic measures of the Foreign Exchange Regulations Act (FERA) of 1973 and replace them by a set

of liberal foreign exchange management regulations. Therefore from 1st June 2000, the Foreign Exchange Management Act (FEMA) was enacted.

FEMA simplified the regulatory regime for foreign-exchange transactions and liberalized capital-account transactions. It also appointed the RBI as the sole monitor of all capital-account transactions. The Act put all foreign-exchange offences under the purview of civil law (these were criminal offences under FERA), thus subjecting them only to monetary penalties. FEMA dictates, among other things, the conditions for Indians holding foreign currency and immovable property outside India (or vice versa) and rules for exporters.

India has completed the first step towards full float of the Rupee by allowing foreign direct investment and institutional investors to bring in and take out money from the country. The second stage of allowing companies and individuals to borrow and invest in foreign exchange has been initiated but not completed in full.

For more than five decades, the Rupee had been steadily depreciating from the level of Rs. 2.40 per dollar prior to 1947 to Rs. 49.07 in June 2002. From July 2002 onwards the rupee appreciated to Rs.43.40 per US dollar as of March 2004. From April 2004, the Rupee has again started depreciating against the US dollar and reached a level of Rs. 46.16 end of September 2004. On 7th December 2004 it reached a level of Rs.43.70. The recent trend shows a lot of volatility in the exchange rates of the Rupee against the US Dollar.

Importance of the Study

Based on the information given above, it is obvious that Capital Account Convertibility has received the attention of policy makers in India ever since we embarked on liberalization. Various studies have aimed at examining the importance of capital account convertibility and its associated macroeconomic factors in terms of its influence on exchange rates. In the first part of this study, the major macroeconomic factors affecting the Rupee - US dollar exchange rates are identified. In the second part of the study, forecasting of exchange rate of the Rupee against the Dollar based on statistical models,

which will treat exchange rate as a function of a number of important macroeconomic factors is attempted. In the third part of the study, a survey is conducted on the foreign exchange risk management practices of Indian companies and the exchange rate forecasting models are used to help companies manage their foreign exchange exposure.

Arrangement of Chapters

CHAPTER – 1: Introduction

This chapter deals with what is capital account convertibility and convertibility concepts on current account and capital account. Then, the benefits of capital account convertibility are discussed. This chapter also covers pitfalls of capital account convertibility based on international experience. Pre-conditions for capital account convertibility are also discussed.

CHAPTER – 2: The evolution of India's exchange rate from the pre-Bretton Woods period up to the current position is highlighted in this chapter.

This chapter discusses the pre-Bretton Woods exchange rates system in India, why the Bretton Woods system broke down, the early years of floating rates, the movement towards a basket-linked exchange rate system, the macroeconomic crisis of 1990-91 and the steps taken towards current account convertibility and capital account convertibility. Foreign exchange regulation aspects and the changes from FERA to FEMA are also discussed.

CHAPTER – 3: This chapter concentrates on literature survey and research methodology. After studying the existing literature on capital account convertibility, exchange rate management and currency risk management for companies, the gap in the research literature has been identified. Based on this, the objectives and hypothesis of the study have been laid down. The primary as well as the secondary data have been collected and the sources of data, their definition and the methodology of analysis of collected data have been explained in this chapter. The limitations of the study are also highlighted in this chapter.

CHAPTER – 4: The recommendations of the Tarapore Committee on Capital Account Convertibility, the pre-conditions stipulated by the Committee and the various signposts laid down in the report are discussed in this chapter. The timing and sequencing of various measures and their current status as of September 2004 are also discussed. Based on the above discussion, the various factors affecting exchange rates are identified.

CHAPTER – 5: In this chapter, the daily exchange rates for the Rupee and the US Dollar for the period January 1973 to November 2004 are studied. The exchange rates have followed a linear depreciating path from January 1973 to June 2002. From July 2002 to November 2004, the exchange rates have turned volatile. Using simulation, the volatility in the exchange rates is demonstrated and the risk of leaving open the foreign currency exposure of companies is highlighted. This leads to the need for forecasting exchange rates for the Indian companies and taking appropriate risk cover through hedging tools like forwards, options and swaps available now in India.

Further, this chapter concentrates on examining the relationship between selected macroeconomic factors and exchange rate of the Rupee against the Dollar. These variables have been identified based on the literature review done by us and also based on the recommendations of the Tarapore Committee on Capital Account Convertibility.

An exchange rate forecasting model is built based on the exchange rate (dependent variable) and nine other macroeconomic variables (independent variables) for the years 1991 to 2004.

Univariate analysis and multivariate analysis are used to find out the correlation between the variables and the extent of dependency of the exchange rate on the nine independent variables.

Time series regression analysis, exponential smoothing method and moving average method are also used for forecasting the exchange rate of the Rupee against the Dollar using the data from January 1973 to November 2004.

CHAPTER – 6: This chapter deals with exchange rate risk management by Indian companies, based on primary data collected from the executives who are dealing with foreign exchange in their companies, through a questionnaire. The opinions of regulators and bankers have also been considered, based on personal interviews. A couple of case studies have also been used for this purpose. The questionnaire data has been analyzed and conclusions drawn.

CHAPTER 7: This being the last chapter of the thesis, it deals with the summary, conclusions and recommendations. Guidance for future research has also been put forward.

CONTENTS

Chapter 2: The Evolution of India's Exchange Rate Regime

Chapter 3: Literature Survey

List of Tables and Charts

Tables

Charts

List of Abbreviations

AD	Authorised Dealer
ADR	American Depository Receipt
ANDA	Abbreivated New Drug Application
ANOVA	Analysis of Variance
API	Active Pharma Ingredients
BOP	Balance of Payments
BOT	Balance of Trade
CAC	Capital Account Convertibility
CAD	Current Account Deficit
CAGR	Compounded Annual Growth Rate
CCS	Cash Compensatory Support
CEO	Chief Executive Officer
CEU	Central European University
CFO	Chief Financial Officer
CMIE	Centre for Monitoring Indian Economy
CMMI	Integrated Capability Maturity Model
CMT	Core Management Team
CoS	Certificate of Suitability
CPI	Consumer Price Index
CR	Current Receipts
CRR	Cash Reserve Ratio
CSF	Consolidated Sinking Fund
DCF	Discounted Cash Flow
E & O	Errors and Omissions
ECB	External Commerical Borrowing
EDQM	European Directorate of Quality Medicines
EEFC A/c	Exchange Earners Foreign Currency Account
FDA	Food and Drug Administration
FDI	Foreign Direct Investments
FEMA	Foreign Exchange Mangaement Act, 1999
FERA	Foreign Exchange Regulation Act, 1973
FI	Financial Institutions
FII	Foreign Institutional Investments
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
GDR	Global Depository Receipt
GFD	Gross Fiscal Deficit
GOI	Government of India
IMF	International Monetary Fund
IT	Information Technology
JV	Joint Venture
LERMS	Liberalised Exchange Rate Management System

LIBOR	London Inter Bank Offer Rate
NEER	Nominal Effective Exchange Rate
NFA	Net Foreign Exchange Assets
NPA	Non-performing Assets
NRI	Non-Resident Indian
OCB	Overseas Corporate Body
PCMM	People Capability Maturity Model
PSPD	Predictability, Sustainability, Profitability and Derisking
QR	Quantitative Restrictions
RBI	Reserve Bank of India
REER	The Real Effective Exchange Rate
SEI	Software Engineering Institute
SPSS	Statistical Package for Social Sciences
USFEDint	United States Federal Reserve Bank Interest Rate
WOS	Wholly Owned Subsidiary

CHAPTER 1

Introduction

Globalization, fostered by the free flow of information and rapid progress in technology, is a driving force that no country can reverse. It imposes market discipline on the participants, which is the mechanism that drives progress and prosperity. Liberalization and globalization are both part of the economic reforms undertaken by many countries in the last decade. Liberalization has two dimensions, internal and external. Pure internal reform confines its attention to the domestic economy and takes measures to make it more responsive to market forces. External liberalization, on the other hand, consists of relaxation of state control in the spheres of foreign trade, foreign investment and flow of finance in and out of the country (Edwards, 1989; Eswar Prasad, Kenneth Rogoff, 2003; Shang-Jin Wei and Kose, 2004). Full convertibility on current and capital accounts is an important component of external liberalization.

1.1 What is Capital Account Convertibility?

In simple terms, Capital Account Convertibility (CAC) means free inflow and outflow of capital. CAC refers to the freedom to convert local financial assets into foreign financial assets and vice versa at market determined rates of exchange. There is minimal control on capital movements.

1.2 Convertibility Concepts

A currency can be considered convertible if both residents and non-residents have unlimited freedom to use and exchange it for any purpose whatsoever, at some definite rate of exchange (Gold 1972). A definite rate of exchange can mean a fixed, floating or flexibly fixed exchange system. The convertibility concept hinges more on the purpose for which the freedom of exchange should be allowed. If the exchange conversions under capital and current accounts do not require any official permission,

the situation resembles "unrestricted convertibility" of the type prevailing in most industrialized countries. However, a number of developing countries' currencies are considered convertible today, compatible with various degrees of trade restrictions and capital controls which are in place.

(a) Current Account

Current account convertibility is embodied in Article VIII, Section 2 (a) of the IMF's Articles of Agreement. According to the IMF's concept of current account convertibility "no member shall, without the approval of the Fund, impose restrictions on making payments and transfers for current account transactions". This definition only implies the absence of restrictions on the settlement of cross-border claims, whether for exports, imports, repatriation of profits, or interest on debt but leaves the regulation of such claims to the discretion of the country in line with national preferences. Thus, while financial convertibility needs to be maintained, members can effectively limit commodity convertibility through import licensing. The IMF clarifies this as follows:

"Restrictions on trade do not become restrictions on payments within the meaning of Article VIII, because they are imposed for balance of payments reasons" (Gold 1972).

Thus, the IMF definition of convertibility is not specific regarding the degree of current account restrictions. Indeed, the spirit of convertibility would be diluted de facto if abolition of payments restriction were accompanied by an intensification of trade restrictions. Convertibility on current account, therefore, becomes a joint product of payments and trade liberalization, which determines the extent of integration of the country's goods market with global markets (Williamson 1991).

It needs to be noted that the introduction of convertibility does not require complete liberalization. To establish rational relative prices from abroad, convertibility measures essentially remove quantitative restrictions on trade and impose moderate tariffs. The relaxation of non-price rationing in foreign exchange allocation has been the central aspect of introducing currency convertibility, since these hamper efficient resource allocation.

(b) Capital Account

CAC would imply the right to export or import capital without restrictions. Full capital account convertibility would mean the right of banks and others to convert domestic currency into foreign exchange and vice versa, and to maintain foreign exchange accounts domestically or overseas. Of course, free capital flows are possible through the use of parallel foreign exchange markets even in the presence of capital controls. What is relevant in the context of an open capital account is the freedom to acquire foreign assets at the official exchange rate.

To an extent, some degree of convergence can be noticed between current and capital accounts of balance of payments. While current account convertibility takes care of the repatriation of dividends, royalties and technical know-how fees, etc., capital account convertibility allows foreign investors to repatriate the capital itself. Simultaneous liberalization of both can promote foreign investment. Williamson (1973) argues that just like allocative efficiency, which provides one justification for freedom of capital flows, the principle of comparative advantage justifies freedom for trade flows.

Resident convertibility implies the right of domestic residents to undertake free foreign exchange transactions. Non-resident convertibility refers to similar rights of exchange by foreigners, designed to attract foreign capital and, thereby, involves liberalization of the regulations on foreign investments, reduction of the levels of taxation on capital gains and dividends on such investments and the right to repatriate the earnings at will by investors. De Varies (1969) defines the distinction between external and internal convertibility as follows:

"A currency is externally convertible when all holdings of that currency by non-residents are freely exchangeable into any foreign (non-resident) currency at exchange rates within the official margins. All payments that residents of the country are authorized to make to non-residents may be made in any externally convertible currency that residents can buy in the foreign exchange market. On the other hand, if there are no restrictions on the ability of a country's residents to use their holdings of domestic currency to acquire any foreign currency and hold it, or transfer it to any non-resident for any purpose, the country's currency is said to be internally convertible. Total convertibility involves both external and internal convertibility".

.3 Benefits of Capital Account Convertibility

(a) Current Account Convertibility

Currency convertibility plays a key role in integrating the domestic economy with the world economy. Convertibility on current account along with trade liberalization enhances the degree of competition in production of domestic tradables and causes world prices to

prevail in the domestic economy (Basu 1993). By lowering of tariff and non-tariff barriers, export competitiveness is improved since industries can procure inputs from global markets at lower costs (Bhagawati and Srinivasan 1993). Convertibility measures, along with the easing of controls on foreign investments, are also expected to boost investment flows and technology transfer.

(b) Capital Account Convertibility

Capital account convertibility leads to the equalization of rates of return across countries. Dismantling capital controls can generate cross-border diversification of assets and liabilities, so that borrowers find lower funding costs and lenders can attain higher yields. Opening up of the capital account and liberalization of the financial market enhances the competitiveness of a country's financial system (Rangarajan and Virmani, 1991; Alok Roy, 1993; Pradhan, 1994; Arvind Panagariya, 2004; Sivakumar Sivaprakasam, 2004).

Convertibility measures in India have accompanied the liberalization of the external sector. The main elements of this opening up process are highlighted below:

1.4 Current Account Measures

i. There has been virtual elimination of quantitative restrictions (QRs) on capital and intermediate goods imports: all twenty-six import-licensing lists are abolished except for a short negative list. All import items are now freely importable at the market exchange rate. The list of canalized items imported or exported through public sector agencies has been drastically reduced.

ii. The maximum tariff rate has been reduced from 150 percent to 25 percent.

iii. The numbers of banned export items have been reduced from 68 to 7, and are limited to goods of ethical and ecological significance.

iv. Payments restrictions on all other items under current account have been freed from exchange controls. Remittance of dividend by foreign investors without RBI approval has been allowed, the facility of maintaining foreign currency accounts is available to exports, release of foreign exchange for foreign travel for business has been freed from RBI control by delegating power to the commercial banks and transparency has been introduced in the system of buying and selling foreign exchange, both spot and forward, by users in India.

v. Export subsidy schemes have been eliminated, except duty drawbacks for exports. These have been replaced by exchange rate adjustments, with the rates decided by market forces of demand and supply. Exchange rates for all transactions are undertaken at the free market exchange rates.

1.5 Capital Account Measures

i. Public and private sector institutions are encouraged to obtain commercial loans abroad without government guarantee. In particular, companies are encouraged to raise equity-based funds such as Global Depository Receipts (GDRs) and American Depository Receipts (ADRs), which have been largely successful. There has been complete liberalization of repayments on foreign loans and equity-based flows at market exchange rate (subject to those which are recorded at the time of arrival).

ii. Almost complete convertibility for non-resident deposits in foreign exchange with Indian commercial banks (upto Dollar 1 million permitted out of NRO Account).

iii. Foreign investment has been significantly liberalized, with removal of the condition for dividend balancing (for all industries except in the consumer goods sector), removal of licensing of industrial capacities, relaxation of exchange controls and removal of the rigours of FERA, specially regarding hiring of foreign technicians, and purchase of immovable property in India and simplification of import-export procedures.

iv. Foreign Institutional Investors (FIIs) are allowed to invest in all the securities traded on the primary and secondary markets (including shares, debentures, warrants, and the schemes floated by domestic mutual funds). No restrictions are imposed on the total volume of such investments and also no lock-in period is prescribed. However, the investments are subject to a ceiling of 24, 49 & 74 percent of issued share capital of the company as per the sectoral policies and the holding of a single FII in any company is also subject to a ceiling of 10 percent of total issued capital.

v. Along with liberalization of foreign investment, emphasis is also being placed on Indian investment abroad, such as Indian joint ventures overseas. For this purpose, all cash remittances upto $500,000 are approved on an automatic basis.

1.6 Pitfalls of Capital Account Convertibility

At the end of 1990, 21 developing country members of the IMF had achieved somewhat free currency convertibility while the remaining were operating under controls of various kinds. The notable features of exchange controls in developing countries are: surrender requirements of exchange accruals, quantitative restrictions on capital flows on both residents and non-residents, dual or multiple exchange rates and taxes on financial transactions.

Governments in developing countries are conservative with respect to capital account liberalization, mainly for two reasons. First, it may lead to flight of capital and, as a consequence, domestic savings are not utilized for domestic investments. Second, there are certain unwelcome repercussions of free capital movements such as unnecessary swings in exchange rates and interest rates.

Let us examine the problems faced by some Asian currencies, which had gone in for Capital Account Convertibility. In 1996-97 there had been a turbulence in the Currency and Stock Markets in most of the South East Asian countries. The problems of South East Asia slowly affected the currencies of some of the stronger economies as well. An analysis of the causes and effects of such debacle is given here under:

1.7 Major causes for the currency crisis in South East Asia

Professors Giancarlo Corsetti, Paolo Pesenti and Nouriel Roubini, (1998) found that countries in South East Asia, which had suffered a major currency crisis during 1996-97 had the following things in common:

a. All these economies which had gone in for CAC had 7% to 8% growth rates in the decade preceding the crisis and growth rates could not be sustained any longer.
b. The economic boom in these countries was driven by a lot of foreign investments in the form of FDI in industry, FII investments in stocks etc., and a host of short term investments for better yield.
c. The economic growth witnessed by these countries had fuelled artificial prices for their shares and real estate prices sky rocketed as more money was chasing the few investment opportunities and most of the industries had built up excess capacities.
d. Corporates had taken large foreign currency debts, a major proportion of it in short term debts.

e. Domestic banks had a large exposure to the property sector advances against securities and were saddled with mounting NPAs.

f. Further, though there had been advance indicators available, the countries had ignored the same.

1.8 Summary of the causes for the Asian currency crisis

Professors Giancarlo Corsetti, Paolo Pesenti and Nouriel Roubini, (1998); and George Allayannis, Gregory W. Brown and Leora F. Klapper, (2001) had summarized the causes for the Asian currency crisis:

Fixed exchange rates regimes, capital inflows and moral hazards jointly led to real appreciation of the currencies and investment boom in wrong sectors in these countries. This led to asset price bubble and large current account deficits that led to accumulation of a large stock of short-term foreign liabilities. Such deficits were financed mostly through banking system intermediation (given the lack of developed securities market in the region). Banks borrowed abroad in foreign currency and their borrowings were mostly short term. These large currency positions were mostly un-hedged as firms and banks expected the fixed exchange rates to be maintained and / or to be bailed-out if things went wrong. Once the firms' investment projects turned out as not very profitable, the firms and the banks found themselves with a huge amount of currency-denominated foreign debt that could not be repaid. The exchange rate crisis that followed made things only worse as the currency depreciation increased the real burden of the foreign-currency denominated debt. The behaviour of weak and not very credible governments that were not committed to structural reforms exacerbated the policy uncertainty and the financial panic that followed.

1.9 **Impact of the Asian currency crisis on India** – India was largely spared the financial upheaval that hit South East Asia. Part of the reason was that India wasn't fully convertible and the foreign exchange controls prevented foreign speculators from playing in our foreign exchange markets. Also India had managed to keep the current account deficit below 2% of GDP and the short-term debt obligations were at manageable levels. However in the last week of December 1997, the Rupee had depreciated by over 7.5% against the dollar mainly initiated by factors such as redemptions by FIIs/hedge funds in India to make up for their losses in the East Asian portfolios.

This was coupled with political uncertainty and exporters holding back the receivables and demand from importers weakening the rupee.
However to arrest the steep fall in the value of the Rupee, RBI came out with the following strategies to shore up the rupee.

a) To mop up the excess liquidity in the system, which was finding it's way to fund the dollar purchases which was driving down the rupee.

b) Perking up the short-term interest rates to align them with medium and long-term interest rates.

c) To prevent corporates and banks from manipulating in the forward market.

The measures initiated by RBI as per the strategy above included the following:

a) CRR rate hiked from 9.5% to 10% in December 1997 and to 10.5% in January 1998.
b) CRR cuts announced earlier in the credit policy kept in abeyance.
c) Interest on fixed rate repos hiked to 9%.

d) The facility allowed earlier in April 1997 to corporates to book forward contracts based on the past performance and declaration of exposure was suspended and forward contracts can be booked only on evidence of exposure.

These measures had their impact on the rupee/dollar rate and the rupee firmed up to below 39 to a dollar.

1.10 Speed and sequencing of Convertibility

After experiencing the Asian Currency Crisis, India understood the importance of timing of CAC, the speed and sequencing of CAC and the preconditions for CAC. The transition from a repressed or inward looking economy to a fully liberalized economy involves heavy adjustment costs. An appropriate sequencing would be one that would set the economy on a stable/ higher growth path, without inflation, debt overhang and balance of payments problems. History is replete with cases where many liberalization attempts have resulted in explosive growth paths and equally quick reversal. Inappropriate sequencing may render the adjustment process more difficult and result in a loss of credibility.

According to the traditional view, macroeconomic stabilization should take place prior to currency convertibility. This sequencing has been advocated on the following grounds:

(i) Stabilization usually entails contractionary policies with effects on output and employment, which if confused with the signals of economic reform, will result in a loss of credibility.

(ii) Macroeconomic instability will result in unstable relative prices, which will give inappropriate incentive signals for resource allocation.

(iii) If the fiscal deficit is not brought under control, the exchange rate will become periodically overvalued.

(iv) The balance of payment deficits should be brought under control prior to import liberalization; otherwise, the latter is likely to precipitate the uncertainty and contribute further to external debt build up.

Although there is consensus regarding current account convertibility, reservations are expressed regarding the feasibility of an open capital account in developing countries. The literature on sequencing has emphasized that developing countries should retain capital controls until trade liberalization is complete. Capital account liberalization has been known to create destabilizing capital flows which lead to high volatility in exchange rates.

The dichotomy between the opening up of trade and capital accounts arises due to differences in the speed of adjustment in goods and financial markets. In the presence of domestic distortions, trade liberalization takes time to yield results. However, a premature opening up of the capital account would stimulate capital inflows, which would get absorbed in the lower priority and non-tradable sectors. Eventually, this may turn into a debt crisis since additional exports will not be generated in the process.

Instead of complete capital account liberalization, India can strategically liberalize capital flows that will boost domestic investment and technology transfer. To that end, capital account convertibility should facilitate the transfer of funds relating to investment flows. What matters in this case is that foreign lenders or investors should have the right to remit their profits from India (which can be achieved with full current account convertibility) and repatriate capital (that becomes part of the capital account).

1.11 Preconditions for Convertibility

For capital account convertibility to be effective, certain preconditions need to be satisfied. Two sets of preconditions are generally cited in the literature: macroeconomic stability and microeconomic strength. Williamson, (1991); Mackinnon, (1991); Joshi and Little, (1993). The macroeconomic conditions require that: (i) there must be adequate reserves; (ii) the level of exchange rate must be appropriate; (iii) the balance of payments must be sustainable in the medium run; and (iv) monetary and fiscal policies must be sound, to hold on to an inflation target. The microeconomic precondition requires that the industry must be sufficiently strong to respond to the threat of competition from imports and a global price system.

In retrospect, the macroeconomic situation prevailing in India during the early 1990s did not justify the move to convertibility. The main argument in its favour was that there was no alternative. Indeed, the macroeconomic crisis provided the basic excuse for an overhauling of the economy.

1.12 Macroeconomic Preconditions

(i) Appropriate Exchange Rate

Exchange rate plays an important role in setting the price level of tradables during the initial phase of liberalization. However, the level of real exchange rate should be broadly consistent with balance of payments sustainability, otherwise, the removal of trade restrictions would generate large imbalances. Exchange rates with trade controls are bound to be overvalued. This is because, once controls are eliminated, the demand for imports at that rate shoots up. Therefore, every liberalization and stabilization programme involves depreciation of the local currency. The devaluation can contribute to

policy sustainability in two ways. First, a devalued exchange rate would promote exports and import substitution (particularly from the sectors where protection has been withdrawn). Second, the absence of devaluation when the trade liberalization is underway would otherwise precipitate the balance of payments imbalances.

(ii) **Adequate Reserves**

The holding of foreign exchange reserves must be adequate, for two reasons, to hold on to the required market exchange rate and to use as a buffer against seasonal and cyclical shortfalls in the balance of payments. A sound reserve position also acts as a precondition for establishing the credibility of macroeconomic reforms and to ensure commercial creditworthiness abroad.

How large are adequate reserves? The answer, of course, depends on the country's trade instability factors and the climate for capital flows. The maintenance of reserves equivalent to at least three months imports has been used as a good thumb rule for countries with a pegged exchange rate. For example, Korea accepted Article VIII in 1988 when its reserves amounted to three months imports. Thailand adopted Article VIII in 1990 with reserves equivalent to five months imports and Poland had reserves and external lines of credit amounting to four-and-a half months' imports when it accepted full current account convertibility in 1990.

The traditional view is that the holding of reserves must be minimal in the presence of floating exchange rates, as the demand-supply imbalances in the foreign exchange market will be corrected by exchange rate changes. Only to defend a peg, the central bank needs to hold adequate holdings of reserves. However there are two reasons why the need for reserves is greater under floating

exchange rates. First, because the exchange rate level is being targeted, it requires the holding of adequate reserves. Second, as already mentioned, reserves could be held for reasons other than financing the balance of payments or managing the float such as the need to preserve credit worthiness and to serve as a basis for raising foreign loans. Given these arguments, policy makers in India need to maintain a given level of desired reserves.

(iii) **Sustainable External Balance**

For convertibility to be effective, the balance of payments situation must be sustainable in the medium run. The balance of payment constraint is sought to be alleviated through a market driven exchange allocation and exchange rate process. Once exchange rates are market determined and import controls abolished, firms which would be able to pay at the market rates will be using the imported inputs. The market rate is expected to self-balance the demand and supply of foreign exchange, thus, curbing the excess demand situation and correcting the present trade imbalances.

However, the balance of payments improvement entirely depends on the export side. What is the use of new imports if they are not used to boost manufactured exports in a bigger way? If the foreign exchange inflows get absorbed in the lesser, priority and non-tradable sectors, additional exports will not be created and it will only accentuate the initial trade imbalances.

India's exports have been determined by a host of external as well as internal factors, and the exchange rate can be just one among the determinants. In the case of primary exports and exports which basically originate from the primary sector, the demand and supply factors are more important. The external factors limiting India's

exports may include slump in global commodity prices, protectionism in the West, changes in Eastern Europe and the former Soviet Union and the shifting global comparative advantage towards inter-industry trade.

On the import side, depreciation may be insensitive to the volume of imports as well as to the production of import substitutes, since a sizeable portion of imports are price inelastic including crude oil, fertilizer, edible oil, capital goods, spares and imports under government account. The fiscal implications of depreciation are also important, since the government is the net spender of foreign exchange for imports and debt servicing.

(iv) **Sound Macroeconomic Policies**

Monetary and fiscal policies must maintain a reasonable degree of stability in the price level and in the macroeconomic environment involving inflationary expectations. Reducing fiscal deficits has two important benefits. It restores internal balance by matching the supply-demand forces in non-tradables and also restores external balance through generation of exportable surplus and curbing liquidity, which will act as a check on import demand. The credibility and sustainability of reforms depend on how fiscal deficits and inflation (also inflationary expectations) remain within certain threshold limits.

As regards fiscal consolidation, certain observations are in order: (i) given the urgent need to reduce the current account deficit, which was largely due to expansionary monetary and fiscal deficits, a case for substantial fiscal adjustment is called for. However, the adjustment must be gradual, taking in to account the recessionary situation in the industrial sector, (ii) the major brunt of fiscal adjustment seems to have fallen on capital expenditure rather than

a reduction in revenue deficit. The modest growth in income tax receipt has been offset by reductions in customs and excise duties. The recommendation of the Chelliah Committee (1993) for a broad based tax reform to compensate for the reductions in tariff revenues remains in the agenda, (iii) revenue expenditures have not fallen, largely due to increase in interest payments and plan revenue expenditure which largely consists of social welfare schemes.

On the fiscal side, therefore, the deficits are to be eliminated to a large extent and there has to be an adequate tax system in place. Excessive adjustment in capital expenditures may operate on the economy as a supply shock.

1.13 Microeconomic Preconditions

Strength of the Industrial Sector

The microeconomic precondition requires that industry must be sufficiently strong to respond to the threat of competition from import and the global price system. The microeconomic benefits of protection cannot be ignored altogether in the opening up process and the withdrawal of protection must be gradual and pre-announced. This is important because the efficiency of the industrial sector cannot be improved in the short run, nor, is resource relocation possible due to low resource mobility. If a large part of domestic industries become uncompetitive with the opening up of the economy at the new (unified and depreciated) exchange rates, loss of industrial output and employment will occur.

History shows that convertibility has been introduced after sufficient strength of the tradable goods sector was acquired and the industrial sector liberalized so as to respond to market forces. The

newly industrialized countries introduced convertibility long after achieving export-led growth viz. Korea in 1988, and Taiwan in 1980, Indonesia and Thailand implemented convertibility in 1988 and 1990, respectively.

At this stage, it would be worth examining the potential microeconomic implications of convertibility and trade liberalization in India. An analysis of the tariff rate at the new exchange rate would reveal that the costs of imports have actually gone up substantially even after the tariff reduction, which can be attributed to the substantial nominal depreciation of the rupee during 1986-92. If this is the case, the threat of competition to Indian industry can come only through the elimination of quantitative restrictions. A case-by-case analysis of duty rates and landed costs of imports was made in the Chelliah Committee report (1993). It was found that the nominal rate of protection for the domestic import substituting industries was not reduced at new (lower) tariff levels; instead it had been enhanced to a significant extent. On an average, the landed costs of 50 imported manufactured items in 1992-93 was 190 percent higher than their 1985-86 level, which reveals the continued import substitution bias. The point is that the industries using these products face an import cost structure, which is almost twice the 1985-86 level. Thus manufacturing enterprises, which use these imports can become uncompetitive at the prevailing world price. Thus, if the devaluation was necessary to establish macroeconomic balance, it has gone against the microeconomic strength of manufacturing industries using imported inputs. It is not surprising that during this short experience of convertibility, the less import intensive industries, particularly from the primary sector, could foster a larger increase in exports.

The Chelliah Committee (1993) recommended a policy of a pre-announced tariff schedule to gradually reduce the import weighted average rate of duties in India to 25 percent by 1996-97. Such a policy had two important benefits; it would discourage investments in inefficient import substituting industries and also provide sufficient time for the highly protected industries to implement restructuring operations. The industries using imported inputs would, however have to face the high costs of imports. A rational policy alternative would have been to maintain the exchange rate at their pre-July 1991 level and adopting a pre-announced tariff schedule (even slightly enhanced tariff schedule) after the liberalization of imports. The main thrust to devaluation has come from the export side, as the official view still holds that devaluation in India has a very positive impact on exports (Rangarajan, 1991; and Virmani, 1991).

Conceptually, import tariffs have been considered as a superior alternative to devaluation during the transitional period (Mackinnon 1991). First, import tariffs yield revenue to the Government and, thus, improve the fiscal position. Second, devaluation is inflationary since it increases the prices of imports and has indirect inflationary impact through resource allocation, whereas tariffs are concentrated on a selected group of imports. Third, the reduction of tariffs can create an intertemporal substitution effect in favour of delaying consumption and, thus, a reduction in the current aggregate demand. This happens because consumers delay their purchase due to the prospect of future price reduction arising from tariff reduction.

1.14 Chapter Summary

This chapter has covered the need for capital account convertibility and the benefits of capital account convertibility. The pitfalls of capital account convertibility based on the international experience of South-East Asian countries are discussed and also their impact on India. The speed and sequencing of convertibility and the preconditions (macroeconomic and micro economic) required for it are covered in this chapter. In the following chapter, the evolution of India's exchange rate from the pre-Bretton Woods period to the current position is highlighted.

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CHAPTER 2

THE EVOLUTION OF INDIA'S EXCHANGE RATE REGIME

This chapter narrates the evolution of India's exchange rate regime in the light of major developments in India and world exchange rate systems. The chapter covers the Rupee – Dollar movement upto November 2004.

2.1 Pre-Bretton Woods Exchange Rate System in India

India's currency system has been a point of attention to economists, academicians and people-related financial administration of the country. It is not a matter of surprise that it has attracted the attention of not less than a world-class economist like J.M. Keynes who wrote a book in 1913 entitled `Indian Currency and Finance'. He noted that the Indian system contained one essential feature namely, "the use of a cheap local currency artificially maintained at par with the international currency or standard of value is the ideal currency of the future". Reviews of India's exchange and currency systems can be found in (Jain, 1933; Bell, 1956; Conon, 1952; Bhagwati, 1974; Black, 1976; Williamson, 1983, De Cecco, 1984; Edwards, 1984; Jadav, 1988; Panchamukhi, 1984; Joseph, 1990; Virmani, 1991;Basu, 1993; JoshiandLittle, 1993; Pradhan, 1994; Prasad, Rogoff and Kose, 2003; Ila Patnaik, 2003; Panagariya, 2004; Sivaprakasam, 2004). Table 2.2 outlines the major events in the history of India's exchange rate system since 1931.

The value of the Rupee was artificially fixed to the Pound Sterling at 1 shilling and 6 pence (i.e., £1 = Rs.13.33) in 1931, following the Hilton Young Commission of 1927. [This rate continued till 1946 when the currency system had viewed the evolution of the Rupee's exchange rate in the context of the growing trade relationship between Britain and India]. The Governor of the Bank of England controlled the Indian currency and the Rupee was kept overvalued for a long period keeping in view the interests of Great Britain as a creditor nation.

Dietmar Rothermund writes:

"The main issue at stake at that time was the maintenance of the exchange rate of the Rupee at 1 shilling, 6 pence. The Rupee was clearly overvalued at that rate, and the old argument – which had been advanced in 1927 – that the rate was in accordance with the prevailing price level, would have sounded ridiculous in view of preceding events. It was stated that the rate be maintained in order to prevent a "flight from the Rupee" at any cost. Sir George Schuster (then finance member of the Government of India) was ordered to follow a deflationary policy so that the contraction of the currency would help support the exchange rate" (Bose 1990).

De Cecco (1984) has established that India had a large trade surplus with the rest of the world but a continuous trade deficit with Britain. Britain's trade surplus with India enabled the former to settle her trade deficits with the rest of the world which remained high as Britain was gradually losing competitive advantage in relation to the US and Germany. Besides, India maintained huge Sterling reserves in London, which were the major sources of reserves for the Bank of England. India's Sterling balances at the end of World War II was reported at £1.3 billion which constituted 35 percent of the total Sterling liabilities of the UK and 52 percent of the Sterling holdings of the overseas Sterling area. (according to Bell, 1956; as reported in Joseph, 1990).

2.2 The Post Bretton Woods Developments

India's exchange rate system remained intact even after the establishment of the Bretton Woods System in 1944, although the existence of Sterling area with exchange controls around it was incompatible with the IMF objective. Under the Bretton Woods System, members of the Fund were to fix their exchange rates in terms of either gold or the US Dollar. However, India complied with the agreement by declaring the value of the Rupee in terms of 4.145142857 grams of fine gold, but the par value was fixed to the then prevailing Sterling parity at 1 shilling 6 pence (i.e. £1 = Rs.13.33). A margin of 1 percent on either side of the parity was allowed within which the Reserve Bank committed to buy and sell

spot Pound Sterling against the Rupee at fixed buying and selling rates. When the Pound Sterling was devalued in September 1949 by 30.5 percent against the US Dollar i.e., from $4.03 to $2.80, India maintained the Rupee Sterling parity at Rs.13.33, thus allowing the devaluation of the Rupee against the US Dollar. This decision was favoured in order to protect the trade interest of India, which was heavily concentrated in Sterling area countries. It needs to be mentioned here that although India's trade became diversified with an increasing proportion of trade being invoiced in the US Dollar (particularly after the adoption of currency convertibility by the major West European countries in 1958) there was no change in the Rupee-Sterling peg till September 1975, except for a brief period during 1971 (August-December) when the Rupee was pegged to the US Dollar. The Pound predominated in three important areas of India's international transactions: currency of pegging, currency of intervention and the currency of reserve assets.

Two major exchange rate developments occurred during the sixties. First, the Rupee was devalued by 57.5 percent on June 6, 1966 by bringing down the Rupee-Sterling rate from £1 = Rs.13.33 to Rs.21. Since the Pound was fixed in terms of the US Dollar, the Rupee-Dollar rate underwent a corresponding devaluation, from $1 = Rs.4.7619 to Rs.7.50. The devaluation was essential to correct the massive overvaluation of the Rupee, as the Indian economy accumulated an overall price rise of over 50 percent during 1951-66 periods. Another exchange rate change occurred when the Pound Sterling was devalued from $2.80 to $2.40 (14.3 percent) in November 1967. The Indian Rupee underwent a corresponding appreciation against the Sterling, from £1 = Rs.21 to Rs.18, although the Rupee-Dollar rate was maintained at $1 = Rs.7.50.

2.3 Breakdown of the Bretton Woods System and the early years of Floating

A major change occurred in August 1971 when the US suspended the convertibility of the Dollar into gold, leading to the collapse of the Bretton Wood's par value system and the floating of many industrialized countries'

currencies. On August 22, 1971, the Reserve Bank pegged the Rupee to the US Dollar at the prevailing level of $1 = Rs.7.50 that had existed since the 1966 devaluation, while still retaining the Pound Sterling as the currency of intervention. Thus, if the Dollar appreciated against the Pound in the London foreign exchange market, the Rupee-Sterling rate was reduced by the same extent to maintain the Rupee-Dollar rate. However, the decision was meant to be temporary, as the Reserve Bank decided to de-link the Rupee from the US Dollar following the Smithsonian realignment of currencies in December 18, 1971 and pegged to the Pound Sterling at the existing rate of £1 = Rs.18.9677. The Pound served as the currency of peg and intervention. The value of the Rupee was fixed to this new Rupee-Sterling parity, but with a wider margin of 2.25 percent on either side of the parity (thus, giving a band of 4.50 percent) that was permitted by the IMF under the new regime. The quick return to Sterling peg was observed as a fall-out of Indo-US political and economic relations, since India was engaged in a war with Pakistan that had strained her relationship with the US and also the suspension of US aid to India (Joshi and Little 1987).

The acceptance of the new Pound-Sterling rate meant a devaluation of the Rupee by 5.38 percent across the board, compared to the prevailing rate of £1 = Rs.18.00. This arrangement with the Pound Sterling as the peg and intervention currency continued even after the UK Treasury floated the Pound Sterling effective from June 23, 1972 and also when the US Dollar was devalued in February 1973. Since the Pound began floating against the leading currencies, the Rupee, in effect, was floating against these currencies and those that were pegged to currencies other than the Pound Sterling.

During this period, severe uncertainties prevailed in the foreign exchange markets of the world. With the floating of the Pound Sterling in June 23, 1972 and the major countries shifting away from the Pound Sterling peg and reducing sharply the share of Sterling in their reserve holdings, the Rupee's external value became uncertain to traders. As Britain joined the European Economic Community in January 1973, the supremacy of Sterling area was virtually

abolished. Indeed, the Pound Sterling underwent continued depreciation, due to UK's balance of payments crisis and the Rupee also depreciated considerably. On the contrary, the Reserve Bank did not use fully its discretionary power to revalue the Rupee to the extent of 2.25 percent. Instead, the Rupee was allowed to depreciate along with the sliding Pound. The revaluation of the Rupee against the Pound Sterling was only 0.093 percent in June 1972 to £1 = Rs.18.60, 0.79 percent in July 1972 to £1 = Rs.18.80 and 1.06 percent in July 1975 to £1 = 18.60, which remained till September 1975 when the basket link was effected. The depreciation of the Pound Sterling on an effective basis as per the IMF data was about 22 percent during June 1972-September 1975. The Rupee depreciated on the nominal effective basis by 21 percent during the same period. The nominal depreciation of the Rupee did not bring about an equiproportionate real depreciation, due to higher inflation in India as a result of a four-fold increase in all prices in 1973, which increased the cost of imports. Between 1970-75, the depreciation of the Rupee on a real effective basis was 15.6 percent. On a bilateral basis the Rupee also depreciated by 9.7 percent against the US Dollar, 25.1 percent against the Yen, 17.7 percent against the Pound Sterling, 39.1 percent against the Deutschemark and 30 percent against the French Franc.

2.4 The move towards a Basket-Linked Exchange Rate System

The developments in the international monetary and trade environment following the adoption of floating by major countries had far-reaching implications for the Indian economy. The policy makers were concerned about how to protect the Indian economy from the sharp fluctuations of free market exchange rates and exogenous shocks such as terms of trade deterioration resulting from rising oil costs and decline in primary commodity prices. Pegging to a single currency meant accepting float against rest of the floating currencies and against non-floating currencies that were pegged to a different standard. The single currency peg was no longer feasible for the Rupee, as India's trade pattern had already diversified. The Rupee had to be protected from free market fluctuations.

On September 25, 1975 the Rupee was delinked from the Pound Sterling and linked to an undisclosed basket of currencies. This arrangement, which remained till February 1992, retained the Pound Sterling as the intervention currency and the Reserve Bank daily established the Rupee-Sterling rate. The exchange rates of the Rupee against all other currencies were determined on the basis of the cross rates with the Rupee-Sterling rate and the Sterling value of the concerned currencies in the London market. The number of currencies included in the basket as well as their relative weights was kept confidential by the Reserve Bank, presumably to avoid speculation. A five percent margin on either side of the basket related parity introduced an element of discretionary management and the Reserve Bank made suitable adjustments in the parity through appropriate changes in the Rupee-Sterling rate. The broad objectives of the basket-pegged regime have been spelt out by the RBI as follows:

"On September 24, 1975, the Government of India, on a view of the exchange rate movements considered it necessary to change over immediately to a new arrangement which, on balance, might be expected to import a greater measure of stability to the Rupee's exchange rate and in consequence, to India's international transactions. Accordingly, the Rupee was delinked from the Pound Sterling from that date and a new arrangement was adopted effective September 25, 1975 under which the exchange value of the Rupee was determined with reference to the daily exchange rate movements of the selected number of currencies of the countries which were India's major trading partners (commonly known as the basket of currencies). The selection of the currency units and the weights to be assigned to them was left to the discretion of the Bank subject to the approval of the Government. The Pound Sterling, however, continued as the currency of intervention" (RBI 1983).

In pursuance of this decision, the Reserve Bank's rates for spot Pound Sterling were revised with effect from September 25, 1975, so as to give a new middle rate of Rs.18.3084 per Pound. Thus, the central rate of Rs.100 = 5.2721 was no longer valid. While effecting subsequent changes in the exchange value of the Rupee, the Bank maintained the Rupee value of the basket of currencies

within a band of 2.25 percent on either side of the base value of Rs.18.3084, adopted at the time the multi-currency basket was introduced. Effective January 30, 1979, however, the exchange rate is being maintained within a wider band, not exceeding 5 percent on either side, the change being found necessary in the light of developments in the currency markets which had been characterized by large and erratic fluctuations. The change, it was felt, would help in fixing a more appropriate exchange rate for the Rupee and in imparting a measure of stability to that rate (RBI, 1983).

The basket-pegged system has been generally accepted by the developing countries that have relatively well diversified trade patterns. It provided scope for a more flexible management of the Rupee for India. The adjustment norm of 5 percent on either side of the parity implied that the authorities may or may not effect a change to the full extent. Secondly, once an adjustment was effected, whether full or part of the stipulated margin, the new parity became the basis for determining the 5 percent margin on either side for subsequent Rupee-Sterling rate change. This discretion transformed the basket arrangement into a managed floating currency in practice. Indeed, the IMF classified the Indian exchange rate system from 1979 onwards as the "managed floating" system instead of a pure basket peg.

One important advantage of the basket peg regime was that a desired effective exchange rate target was achieved without undertaking any discrete exchange rate change. As one component of the currency basket i.e., the Rupee-Sterling rate, served as the intervention currency, a series of backdoor devaluations could be affected over an extended period of time to achieve a large change (Table - 2.2 for the Rupee-Sterling rate changes). This was the main strategy of exchange rate adjustment pursued during the eighties. Another advantage of the basket peg was that it enabled implementation of exchange rate policy in line with national preferences. For instance, India could allow its exchange rates to depreciate due to market forces by refusing to intervene through the Rupee-Sterling rate change.

The Rupee-Sterling rate was devalued on a step-by-step basis by 2.8 percent during 1975-79, i.e. from £ 1 = Rs.18.31 to 17.80. This, however, led to depreciation of 5.7 percent of the nominal effective exchange rate (NEER[1]). The larger fall of the NEER was mainly due to the fall of the US Dollar in world foreign exchange markets during the period along with which the Rupee also slid. However, there was a steep depreciation of the real effective exchange rate (REER[2]) by 15.3 percent, since domestic inflation had grown slower than the combined foreign inflation.

NEER[1] – Nominal effective exchange rate measures the relative price of two currencies (say, units of domestic currency per US Dollar),

REER[2] - The real effective exchange rate establishes the relative purchasing power of two currencies in the goods markets. The real exchange rate has been obtained by deflating the nominal rate by an index of relative prices between home and abroad.

2.5 Exchange Rate policies in the Eighties

The years during the eighties were the most turbulent period in world foreign exchange markets, characterized by unprecedented volatility and large swings in major country exchange rates. There were two distinct phases in the movements of the major country exchange rates. The first phase spans the period 1980-85 and the second phase over 1985-87. There was a sharp appreciation of the US Dollar and a decline of all other major currencies during 1980 to 1985. At the end of the first quarter of 1985, the appreciation of the Dollar was 90 percent against the Sterling, 58 percent against the Deutschemark, 48 percent against the Swiss franc and 25 percent against the Yen. In the second phase (1985-87), the US Dollar fell sharply. The reversibility of the exchange rates around their trend line made the Reserve Bank effect frequent Rupee-Sterling rate changes, which increased from just 1 in 1976 to 34 in 1980 and 154 in 1985. However, the average magnitude of change in the Rupee-Sterling rate gradually declined i.e. 3.08 percent in 1976, 3.49 percent

in 1977, and 1.45 percent in 1979 and less than 1 percent thereafter. This revealed the strategy of the Reserve Bank of effecting small but frequent discretionary devaluations of the Rupee, something very much similar to the crawling peg arrangements of the Latin American countries.

During 1980-85, the Reserve Bank had to appreciate the Rupee against the Pound Sterling to achieve an orderly decline of the Rupee against the US Dollar. The Rupee depreciated against the US Dollar by 36 percent, and at the same time appreciated against the Pound by 31 percent and 38 percent against the French Franc. On the whole, the Rupee actually appreciated in nominal and real effective terms during the period. Indeed, between 1979-83, the appreciation was 12.3 percent in NEER and 21 percent in REER. The external value of the Rupee was fast deteriorating during the second half of the eighties. Between 1985-90, the NEER depreciated by almost 50 percent and the REER by 30 percent.

2.6 Exchange Rate adjustments in July 1991 and March 1992

Two significant exchange rate adjustments were made during 1991-92. The first was in July 1991 when the Reserve Bank sharply devalued the Rupee in two stages, to £1 = Rs.34.36 on 1st July and to Rs.41.56 per Pound on 3rd July. These were the first discrete adjustments since the 1966 devaluation of the Rupee. The second adjustment was in March 1992 when the Rupee was made partially convertible. The shift from the basket peg to the new regime based on partial convertibility was partly a surrogate for the devaluation of the Rupee. There was a one-shot depreciation of the Rupee following the introduction of partial convertibility, from Rs.26 to Rs.30 a US Dollar and from Rs.45 to Rs.50 a Pound Sterling (based on the market rate). While the market rate had undergone sharp devaluation, the official rates for the US Dollar were pegged at Rs.25.954 for imports and Rs.25.826 for exports (rates are converted from the indirect quotations).

With these two changes during 1991-92, the Rupee underwent considerable nominal and real devaluation against all major currencies important to India's trade. Most of the devaluations were achieved primarily after 1985 and during 1991-92. The prolonged devaluation of the Rupee in nominal and real terms during the period revealed the strategy of the policy makers to use the exchange rate for the balance of payment adjustments.

2.7 Macroeconomic Crisis: 1990-91

The movement towards convertibility was in response to the macroeconomic crisis that shattered the Indian economy during 1990-91. The macroeconomic crisis was the reflection of an unprecedented foreign exchange crisis with unsustainable payments deficits, rapid depletion of reserves, mounting external debt burden, and unmanageable budget deficit and inflation (Rangarajan, 1991).

The basic underlying factors for the balance of payment crisis were high internal inflations (11.60 percent in 1990-91), large fiscal deficit (10.5 percent of GDP in 1990-91) and high internal debt build up (about 48 percent of GDP). The current account imbalances reflected an excess of national expenditure over national income, a situation aptly termed as a "nation that lives beyond its means". The exchange rate depreciation in real terms did not work since the imbalances arose primarily from expansionary policies and the liberalized import structure. Although real exports grew by about 10 percent in the second half of the 1980s, it was insufficient to meet the increased demand for imports after its partial liberalization and rapid growth in interest payments on external debt.

The current account deficit was sustained mainly by borrowing from commercial sources and NRI deposits, which with short maturities and variable interest rates, resulted in a bunching of repayment burden towards 1990. The size of external debt reached $75 billion in March 1990, 45 percent of which was contracted from private creditors at variable interest rates. The debt

service payments had reached 30 percent of export earnings, which was close to some of the heavily indebted countries such as Indonesia (31 percent), Mexico (28 percent), Nigeria (20 percent), and Turkey (28 percent).

The foreign exchange crisis was worsened by the Gulf war that began in August 1990 and resulted in shortfall in exports to West Asia, loss of remittances from Kuwait and Iraq, foreign exchange costs of emergency repatriation and, above all, additional cost of oil imports due to the oil price increase. The Gulf crisis coincided with recessionary trends in the West that had depressed the demand for India's exports. Furthermore, the economic decline in Eastern Europe led to a contraction of exports to these markets. The uncertain political climate at home along with the precarious balance of payments situation led to the erosion of India's credit ratings abroad. Moodys' Investor Services, the US based credit rating agency, had downgraded India's status to BB, the highest speculative grade for long term debt.

There were indications that the net resource transfer on account of official and private credit became negative in 1990-91 i.e. the fresh inflows were not even adequate to meet the obligations on account of amortization and interest payments. The level of foreign exchange reserves fell to just $1 billion in 1990-91. This desperate situation led the Reserve Bank to sell 20 tonnes of gold in May 1991 and pledge another 46.91 tonnes in July 1991, to meet foreign exchange needs. An imminent foreign exchange crisis loomed large before the Indian economy.

2.8 Economic Reforms: The Rationale

The unsustainable balance of payments situation, which was aggravated by the Gulf crisis in August 1990, could be considered as the symptom of a disease caused by the trade and industrial regime, which had protected the economy from both internal and external competition. Without going into any empirical verification, the following propositions, which have been well accepted in the

literature, (Bhagawati and Srinivasan, 1993; Rangarajan, 1993; Nayar, 1993; Joshi and Little, 1993) can be stated:

i. The import-substituting inward looking trade regime adversely affected domestic productivity and specialization.

ii. The inefficiency of the trade regime had much to do with prohibitive tariffs and a pervasive system of import controls.

iii. Quantitative restrictions (QRs) and high tariffs created an extremely high level of protection and incentive for import substitution in manufacturing and, therefore, led to a pronounced anti-export bias.

iv. The shrinking share of India's exports in global trade could be considered a reflection of receding export competitiveness and the absence of a right kind of commodity mix in the export basket.

v. India's poor export performance occurred at a time when the East Asian economies forged way ahead in terms of export growth.

vi. There was a high allocation in the budget on export subsidization and duty reimbursements to exporters.

vii. Non-market allocation of foreign exchange and administered rate fixation gave rise to parallel market trade, mis-invoicing and capital flight.

viii. Unauthorized markets also acted as conduits, for the financing of smuggling operations into and out of the country.

ix. The black market for foreign exchange was largely supported by the official gold movements into India. Domestic gold price was higher and increasing faster than the international gold price and this supported gold smuggling into India.

2.9 From crisis to convertibility

The adoption of current account convertibility and exchange unification was a part of the IMF-supported structural adjustment programme for India that began in 1991. Following the acceptance of this programme, India devalued the Rupee by 21 percent against the Pound and 22 percent against the Dollar in July 1991. This was followed by important trade policy changes. One of them was the suspension of the Cash Compensatory Support (CCS) for exporters. The redundancy of the CCS scheme was felt after devaluation, because after adjusting for removal of the CCS, there was a net devaluation gain to exporters. However, the relative incentive structure was different across

sectors, since the cash subsidies were different for different sectors and the industries with high import intensity suffered a cash loss.

Another change was the replacement by the "Exim Scrip" scheme of the existing system of Replenishment licenses (Rep licenses), which were issued to exporters to replenish imported raw materials required for the production of exportables. Rep licenses were granted on the basis of rates, which were in the range of 10 to 20 percent of the f.o.b value of exports. Although the Rep licenses were issued to meet input requirements for the production of exportables, the issue of licenses in many cases was ad hoc and, therefore a secondary market existed where such licenses could be sold at a premium (the premium was about 25 percent in June 1991).

The EXIM scrip scheme brought rationalization to the Rep license scheme, by granting to all exporters, to cover even those who were not using imported inputs, a standard rate of import entitlement at 30 percent of the f.o.b. value of exports (which was revised to 40 percent for some import intensive sectors). The scrips were made freely tradable which fetched, to begin with, about 40 percent premium to exporters. Thus, the EXIM scrip scheme established a dual exchange rate system between the exporter and importer and, in a way, the scheme did not benefit the highly import intensive exports.

The 1992-93 Budget scrapped the EXIM scrip scheme for two reasons. First, the premium on the scrips dropped from about 45 percent to 10 percent, which made them an unattractive proposition. Second, the scheme could be misused since the scrips were in the bearer form. The incentive aspect of the EXIM scrip scheme was sought to be incorporated through the `partial convertibility' of the Rupee effective from March 3, 1992. The Reserve Bank termed this as the "Liberalized Exchange Rate Management System" (or LERMS as it is termed). This system established dual exchange rates for the Rupee, by creating a free market rate and an official rate. It envisaged that 60 percent of all exchange receipts on current account be surrendered at market exchange rates determined by the authorized dealers (ADs.) of foreign exchange - mainly

commercial banks - and the remaining 40 percent exchanged at the Reserve Bank's official rate. Since the market rates were depreciated by about 15 percent below the official rates, exporters got a rate equivalent to the weighted average of the market rate and the official rate (at 60:40 norm), while most of the private imports were paid at the (depreciated) market rates. The 40 per-cent amount surrendered to the Reserve Bank at the official rate was used generally for meeting payments for imports of national priority such as crude oil, fertilizers, life saving drugs and some government imports.

The partial convertibility system was considered superior to the EXIM scrip scheme since the premium on official rate (i.e. the market rate) was for 60 percent of the total exports, as against about 30 percent of total exports in the EXIM scrip scheme (Virmani 1993). It is important to note that with the introduction of partial convertibility in March 1992, the basket-peg arrangement was totally dispensed with. The official announcement was that the Reserve Bank's quotations of official rates for the 40 percent of export earnings were decided on the basis of the basket mechanism hitherto adopted. However, the Reserve Bank chose to maintain an implicit US Dollar peg at $3.853 for imports and $3.872 for exports per Rs.100 for the period March-December 1992 and there was, thus, no such thing as the basket. Effective March 1992, Section 40 of the RBI Act was amended to replace the Pound Sterling by the US Dollar as the currency of intervention.

2.10 Full convertibility of Current Account

The system of partial convertibility seemed to have worked well, as far as the trend in the exchange rate level was concerned. The stability of the Rupee around its medium term trend provided the necessary confidence to the government to adopt full convertibility of the Rupee on current account in the Budget of 1993-94. Moreover, the system of partial convertibility was considered as a tax on exporters, since 40 percent of the foreign exchange earnings were surrendered at a discount (of about 15 percent) from the market rates. The full float of the Rupee on current account effective March 1993, thus eliminated the earlier dual exchange rate system. Free market forces of

demand and supply have determined exchange rates of the Rupee and imports, including the government imports, are transacted at these market rates. This heralded a new era in the history of exchange rate management in India.

2.11 Capital Account Convertibility

In his budget speech for 1997–98, the Union Finance Minister Shri P. Chidambaram indicated that the regulations governing foreign exchange transactions needed to be modernized and he felt the time had come for preparatory work towards capital account convertibility. This led to the setting up of Tarapore Committee to recommend measures that should be taken to achieve full capital account convertibility and to specify the sequence and time frame in which such measures were to be taken. The committee in its recommendations gave a set of pre conditions to be fulfilled in a phased manner from 1997 – 98. We study the recommendations of Tarapore Committee for their implications on exchange rates in detail in Chapter – 4.

2.12 Foreign Exchange Regulations

The Foreign Exchange Regulations Act (FERA) of 1973 and its amendments were replaced on June 1st 2000 by the Foreign Exchange Management Act (FEMA), which established a simplified regulatory regime for foreign-exchange transactions and liberalized capital-account transactions. It also appointed the RBI as the sole monitor of all capital-account transactions. The Act put all foreign-exchange offences under the purview of civil law (these were criminal offences under FERA), thus subjecting them to only monetary penalties. FEMA dictates, among other things, the conditions for Indians holding foreign currency and immovable property outside India (or vice versa) and rules for exporters.

The rupee has been fully convertible on the current account since August 1994. Under FERA, all foreign-exchange transactions that were not specifically authorized were prohibited; FERA later reversed this, so that only specifically

prohibited activities are not allowed. Every transaction involving foreign exchange is subject to controls set out in the RBI's Exchange Control Manual, which specifies procedures to be followed by authorized dealers. (Mainly banks are licensed to deal in foreign-exchange transactions).

New rules effective from June 1st 2000, when the Foreign-Exchange Management Act came into force, affect current-account transactions. The new regulations raised the ceiling on withdrawal of foreign exchange for a host of current-account transactions, including private and business travel abroad. For private visits, the cap was raised to US $10,000 from US $5,000. Anything exceeding US $10,000 within 12 months requires the approval of the RBI. For overseas business travel, the ceiling for release of foreign exchange was raised to US $25,000 per person, regardless of length of stay. Earlier the limit was a daily allowance of US $350-500 for a maximum of 45 days. The rules include a negative list, which bans withdrawal of foreign exchange for remitting earnings from lotteries, racing or other hobbies overseas, buying lottery tickets or paying for call-back services. The RBI also allowed branches of foreign companies operating in India to remit profits to their head offices, through authorized dealers of foreign exchange without the RBI's prior approval. The RBI directed all authorized foreign-exchange dealers to accept unlimited foreign-currency notes or travellers cheques from tourists and non-resident Indians visiting India where the proceeds are to be credited to the resident and non-resident accounts of the tenderers. It also asked bankers not to insist on further documentation or to enquire into the source of the instruments, provided they follow the normal safeguards prescribed for credit into non-resident accounts. In September 2002, the RBI allowed authorized dealers to release up to US $50,000 for medical treatment abroad without extensive documentation.

There have been some advances on capital-account convertibility, though it remains largely a one-way benefit – foreign institutional investors may bring in funds that may be repatriated, and Indian companies may borrow from international markets with the RBI's approval. But Indian residents and firms may not freely convert the rupee in order to acquire assets or lend funds

overseas. The government and the RBI have slowly liberalized capital-account transactions, by allowing Indian companies to make limited investments abroad and ADR or GDR issues fund such investments

2.13 The 'Managed Float' system

Although the exchange rate system in India is supposed to be a full float, the RBI intervenes in the market at regular intervals to direct the movement in Rupee values (thus the term "managed float"). The intervention by the RBI in the market could be passive (whereby the apex bank engaged in off-market deals) or active (whereby it purchases or sells Dollars). Intervention could also be made through statements (to the press or otherwise) in times of exchange rate crises, or in extreme circumstances, through a package of monetary and other measures. Therefore, it may well be stated that the exchange rate system in India is not exactly full float.

The accompanying Table – 2.1 summarizes the alternative exchange rate systems in use across the world. As we move from the top to the bottom of the Table, the degree of flexibility that the system imparts to the economy declines.

Table - 2.1: Alternative Exchange Rate systems in use across the world

Regime	Main Features	Comments
Free Float	Value of foreign exchange freely determined.	Virtually no country has pure float. The U.S., Germany, Switzerland (and Japan, according to some) come close.
Managed Float	A managed float may be conceived as a float with wide bands, with the (undisclosed) position of the bands providing the criterion for intervention. In this system, central bank intervention in the market is sporadic.	Many advanced economies have adopted this regime, e.g. Canada, Australia, (Japan, according to others) and Mexico, following the 1994-95 crisis, India falls into this category.
Floating within a Band (Target Zone)	The nominal exchange rate is allowed to fluctuate (somewhat freely) within a band.	This is the exchange rate arrangement of the European Monetary System (ERM).
Crawling Band	A band system where the central parity crawls over time.	Israel adopted this system in December 1991. Chile had a widening band from 1986 to mid-1998; Italy between 1979 and 1991.
Crawling Peg	The nominal exchange rate is adjusted periodically to a set of indicators (usually lagged inflation differentials) and not allowed to fluctuate beyond a narrow range.	This system as popular during the 1960s and 1970s in Chile, Colombia and Brazil.
Fixed-but-Adjustable Exchange Rate	This is the Bretton Woods system. The nominal exchange rate system is fixed, but the central bank is not obliged to maintain the parity indefinitely.	This is the most popular system. Most developing countries held on to (variants of) this system (Mexico, 1983-1993) after the formal collapse of Bretton Woods, and continue to do so in practice.
Currency Board	In this system, the exchange rate is strictly fixed, with institutional (legal and even constitutional) constraints on monetary policy. The monetary authority can only issue domestic money when it is fully backed by inflows on foreign exchange.	When faced with major external shocks countries have abandoned this regime. Currently, Hong Kong has a currency board.
Full Dollarisation.	In this system, the country concerned gives up its monetary autonomy completely by adopting another country's currency.	There have been only few instances of full Dollarisation. It worked well in Panama.

Source: Edwards and Savastano, National Bureau of Economic Research – 1999.

As the Table shows, the exchange rate system in India is quite flexible (the managed float system is second only to free float in terms of flexibility) and has worked well so far. Interestingly, although the Indian system is flexible, the RBI has not hesitated to intervene in the foreign exchange market (both spot and forward). And, it has always intervened with a definite purpose (either implicit or explicit) and sometimes continuously for several days. For instance, it has now prioritized its intervention patterns in the foreign exchange markets, given the adverse effects of exchange rate volatility on export growth.

2.14 Chapter Summary

In this chapter, the evolution of India's exchange rate regime in the light of major developments in India and world exchange rate systems is covered. The major exchange rate systems in use in the world are given in Table - 2.1. The major events in the evolution of India's exchange rates are given in Table - 2.2.

Table - 2.3 gives the details of the exchange rates of the Rupee against the US Dollar. For more than five decades, the Rupee has been steadily depreciating from the level of Rs.2.4 per US Dollar prior to 1947 to Rs.49.07 in June 2002. From July 2002 onwards, the Rupee has appreciated from Rs.49.07 per US Dollar to Rs.43.40 per US Dollar as of March 2004. From April 2004, the Rupee has again started depreciating and reached the level of Rs.46.16 per US Dollar as of 30th September 2004. On 7th December 2004 it reached a level of Rs.43.70. This shows lot of volatility in the exchange rate of Rupee – Dollar in the last nine months.

After discussing the evolution of exchange rate regime in India, now it seems necessary to review the existing literature in depth on capital account convertibility, exchange rate management and corporate risk management to develop the study further. This is covered in the following chapter.

Table - 2.2: The Evolution of India's Exchange Rate Regime (At a glance)

Year	Type of change
1931	The Indian Rupee was formally pegged to the Pound Sterling at the prevailing rate of Re.1 = 1 shilling 6 pence (or £1 = Rs.13.33). A de-facto Sterling standard for the Rupee was established.
1946	India intimated the par value of the Rupee at Re.1 = 0.268601 gm of fine gold, retaining the Rupee Sterling peg at Re.1 = 1 shilling 6 pence.
1949	Sterling devalued from $4.03 to $2.80 (30.5 percent) in September. The Rupee Sterling rate remained at Re.1 = 1 shilling 6 pence, but the gold value of the Rupee was reduced to Re.1 = 0.186621 gm and the Dollar-Rupee rate devalued to $1 = Rs.4.7619.
1961	Full current account convertibility was restored to Sterling in February. The Dollar pool arrangement within the Sterling area began and this weakened the Sterling area link
1966	The Rupee was devalued by 57.5 percent on June 6 against the Sterling i.e. £1 = Rs.13.33 to Rs.21.00. The corresponding devaluation of the Dollar from $1 = Rs.4.7619 to Rs.7.50 and the gold parity from Re.1 = 0.186621 gm to 0.118489 gm
1967	Sterling was devalued in November from $2.80 to $2.40 (14.3 percent) and thus the Rupee-Sterling parity changed to £1 = Rs.18.00, while the US Dollar and gold parity remains unchanged since 1966.
1971	The Bretton Woods System broke down in August. The Rupee was pegged to the US Dollar of $1 = Rs.7.50 but re-pegged to the Pound Sterling at £1 = Rs.18.9677 in December, with a margin of 2.25 percent on either side.
1972	The Pound Sterling was floated on June 23. India's Pound-Rupee parity was revalued on June 26 to £1 = Rs.18.95. RBI temporarily suspended the purchase of US Dollar between June 24 to October 9. Rupee was revalued to £1 = Rs.18.80 on July 4 due to the depreciation of the Pound against US Dollar.
1975	The Rupee was pegged to an undisclosed currency basket on September 25 with the prevailing margin of 2.25 percent on either side. The Rupee Sterling rate served as the intervention currency fixed at the time of £1 = Rs.18.3084.
1979	The margins around the basket related parity was broadened to 5 percent on January 30, thus giving a 10 percent band.

1991 (a) The Rupee was devalued by 21 percent through Rupee Sterling rate, from £1 = Rs.34.36 to Rs.37.19 on July 1 and to Rs.41.56 on July 3. The Rupee depreciated by 22 percent against the US Dollar from $1 = Rs.21.20 to Rs.25.80.

(b) A dual exchange rate system was introduced through EXIM scrips, granting exporters freely tradable import entitlements equivalent to 30-40 percent of export proceeds.

1992 (a) The Liberalized Exchange Rate Management System was introduced under which 40% of the proceeds of exports and inward remittances are purchased at the official rate of exchange by the Reserve Bank for official use. All other receipts and payments are converted at the market rate of exchange. Permissible receipts and payments on capital account are transacted at market rates (except in the case of transactions like IMF flows).

(c) The US Dollar became the intervention currency with effect from 4th March.

1993 India shifts to "market determined exchange rate".

1994 Full convertibility of the Rupee on current account announced.

1997 Dr. C. Rangarajan, Governor, Reserve Bank of India, on February 28, 1997 appointed a committee under the Chairmanship of Sri S.S. Tarapore to recommend measures for capital account convertibility.

2000 Foreign Exchange Management Act replaces Foreign Exchange Regulation Act of 1973.

Table - 2.3: Rs. per US Dollar from 1947 to 2004

Prior to 1947	2.40
Upto June 6, 1966	4.76
From June 6, 1966 to Mid-December, 1971	7.50
Mid-December 1971 to End-June, 1972	7.28
72-73	7.71
73-74	7.79
74-75	7.98
75-76	8.65
76-77	8.94
77-78	8.56
78-79	8.21
79-80	8.08
80-81	7.91
81-82	8.96
82-83	9.67
83-84	10.34
84-85	11.89
85-86	12.24
86-87	12.78
88-89	14.48
89-90	17.22
90-91	19.61
91-92	29.10
92-93	31.50
93-94	31.37
94-95	31.43
95-96	34.35
96-97	35.88
97-98	39.53
98-99	42.50
99-00	43.65

00-01	46.85
01-02	48.83
02-03	47.53
03-04	43.39
30th June, 04	45.98
30th July, 04	46.45
31st Aug, 04	46.34
30th Sept, 04	46.16
29th Oct, 04	45.45
30th Nov, 04	44.75

Source: RBI Website - rbi.org.in

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CHAPTER 3

LITERATURE SURVEY AND RESEARCH DESIGN

In this chapter, an effort is being made to study the existing literature in a detailed and systematic manner so that the research gap could be identified. For a structured presentation of the literature review, it has been classified into three distinct categories, namely, capital account liberalization, exchange rate management and corporate risk management.

The first part deals with the review of literature on capital account liberalization and the pre-requisites for moving towards capital account convertibility. The literature survey leads to the identification of major macroeconomic factors affecting exchange rates. Then, the review of literature on exchange rate management and corporate risk management is done to identify the research gap. On the basis of this gap, the objectives and the scope of the study have been presented. Data sources, methodology, sample selection, collection of data, data analysis and limitations of the study have been presented under separate sections.

3.1 Review of literature on Capital Account Liberalization

Most economists agree that in the past two decades, the world has slowly but steadily moved towards greater capital account openness. While this trend may have been deeper in developed countries, it is not necessarily restricted to them. In the words of Michel Camdessus (1988), the then IMF's managing director, "there is considerable amount of work to be done at the national and international level to ensure that the pre-conditions for the freedom of capital movements are in place. The big picture is clear. There is an irresistible trend towards Capital Account Convertibility".

Economic theory suggests a number of benefits that may accompany capital account liberalization. Open capital account can foster a more efficient allocation of resources, provide opportunities for risk diversification and help promote financial development.

There is a large and growing literature that tests the potential benefits of capital account liberalization through its influence on long-run growth and development, by directly investigating the empirical relationship between capital account liberalization and economic growth.

Almost all of these studies augment a basic growth model that includes variables such as the investment, population growth, the level of GDP and the level of schooling.

Quinn's (1997) is one of the first studies to identify a positive result between capital account liberalization and growth. Quinn's empirical estimates suggest that change in capital account liberalization has a strong significant effect on growth in real GDP per capita in his cross section of 58 countries over the period 1960 to 1989.

Klein and Olivei (1999) find a positive effect of capital account liberalization on growth among industrial countries, but they do not find evidence that capital account liberalization promotes growth in non-industrial countries. They conclude, based on a cross section of 82 developed and developing countries, that beneficial effects of Capital Account Liberalization are achieved only in an environment where there is a constellation of other institutions that can usefully support the changes brought about by the free flow of capital.

Bailliu (2000) also finds that Capital Account Liberalization spurs growth by promoting financial development.

The growth effects of Capital Account Liberalization depend upon the level of development of an economy is supported by the results presented in Edwards (2001).

Arteta, Eichengreen and Wyplosz (2001) find that effect of Capital Account Liberalization across countries depends on the degree of macroeconomic stability.

Bekaert, Harvey and Lundblad (2001) examine the impact of Capital Account Liberalization and stock market liberalization on economic growth. They find that liberalization leads to increase in GDP.

Klein (2003) provides evidence that Capital Account Liberalization significantly contributes to growth among middle-income countries but not among the poor or the richest countries. This finding that the middle income countries benefit from Capital Account Liberalization through capital flows is consistent with the view of Rodrik (1999) that countries require adequate institutions, regulatory policies and supervisory agencies to benefit from capital flows.

Dr Y.V. Reddy (2000) states that there is a broad consensus on Capital Account Liberalization but it should be gradual, well sequenced and undertaken in conjunction with several other measures at the macro and micro level. He advocates limiting external debt, especially short-term and adequate foreign exchange reserves. He stated, "Optimal level of reserves and their management is very critical to overall capital account management, especially the sentiments prevailing in the foreign exchange market".

Ashok K. Lahiri (2004) states, "Important lesson that emerges from the East Asian crisis is that the interaction between highly liquid global markets and poorly supervised financial systems can lead to a financial disaster. At the time of crisis, all crisis-affected countries had weak supervision and a somewhat inadequate reporting system. Relative openness on the Capital Account led to a lending boom and the eventual bursting of an asset bubble. The solution is

not in postponing liberalization, but appropriately sequencing capital account liberalization and financial sector reforms.

In the light of the above views, it is understood that capital account liberalization is very important for mobilizing private foreign capital and it is very essential for growth and progress of developing countries. The literature survey further reveals that there is a need for sequencing of capital account liberalization, but the ways and means of sequencing the capital account liberalization is not shown.

An expert committee, popularly known as the Tarapore Committee was appointed by RBI to examine along with other things the sequencing of capital account liberalization and the pre-requisites for moving to capital account convertibility.

The recommendations of the Tarapore Committee and the pre-conditions set out for Capital Account Liberalization are studied in detail in the following Chapter No.4. These recommendations have major implications on factors affecting the exchange rate of the Rupee against the Dollar.

Now, the literature available on Exchange Rate Management is studied in detail.

3.2 Review of literature on Exchange Rate Management

Prof. H.K. Pradhan (1993) in his paper on exchange rates discusses India's balance of payment problems and devaluation. Currency devaluation generates price incentives for exports in two ways: it increases the domestic currency price or reduces the foreign currency prices of exports (or a combination of both). International evidence suggests that the supply elasticities of the primary product are extremely low and the external price and income elasticities are also low. The low external price and income elasticities would imply that countries couldn't boost the volumes of exports at the given US dollar price.

Arvind Virmani (1997) stated that private capital flows transformed the foreign exchange markets. He argued that capital flows generally had a long-term horizon and must therefore be based on projections about future development of the economy. Expectations therefore entered the picture. From experience we have learnt that political uncertainty, social upheaval and perceptions of Governmental indecisiveness had a negative effect on expectations.

The effect of private investment flows is that the exchange rate and its future evolution are important factors in determining the profitability of foreign investment and therefore on the investment flows. This introduces circularity into the determination of exchange rates. Virmani further pointed out that trade imbalance and expectations have a major impact on exchange rates.

Arvind Virmani (1999) also warned that fiscal deficit had risen dangerously high and it would have an impact on the current account deficit as it was due to increase in defense imports.

The recent literature (Patnaik, 2003; Calvo & Reinhart, 2002; Reinhart & Rogoff, 2002) has argued that India has had highly limited currency flexibility over the 1979-2002 period. Sometimes there has been a fixed exchange rate peg (such as the period in the 1990s where the exchange rate was 31.37 per Dollar). This literature has shown that while India made a great deal of progress on removing restrictions on the current account and capital account in recent decades, little has changed in terms of exchange rate flexibility.

Patnaik (2003) discusses that net capital inflows during 1993 to 1995 were met by unsterilized intervention: RBI purchased foreign exchange to keep the nominal exchange rate constant and thus to keep the real rate from appreciating. The paper concludes that as a consequence, reserve money and M3 expanded, leading to higher inflation. The paper then contrasts this with the second episode of capital flows starting from April 2002, which was handled by

sterilized intervention and reduced monetary growth. Inflation remained low but the gap between Indian and global short-term interest rates widened and consequent arbitrage inflows into India. This increased the currency volatility.

RBI faces three paths for implementation of India's de-facto peg to the US Dollar and reducing the volatility in exchange rates. They are:

(1) Direct intervention on the currency market

(2) Intervention on the currency market at the behest of RBI through other banks such as State Bank of India

(3) Indirect instruments: money supply, interest rates and administrative controls.

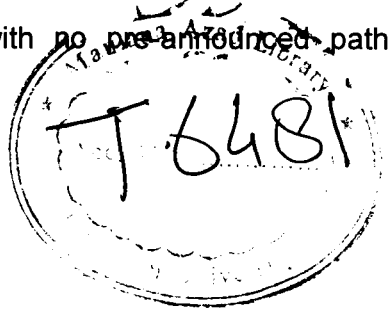
One view advanced by several distinguished economists, including Prof. Kenneth Rogoff of IMF during his visit to India, is that the Rupee should be allowed to appreciate freely in line with market trends. According to this view, there is no strong case for RBI's intervention as reserves are already very high. RBI's purchases create substantial additional domestic liquidity, which may be destabilizing in the long run. There is also no evidence that unconstrained appreciation or volatility would affect growth prospects or lead to any other macro-economic problem.

An exactly opposite view held by the Confederation of Indian Industries is that RBI should intervene more aggressively in the market to further reduce the degree of currency appreciation. The main argument in favour of this view is that India must maintain its global competitiveness, particularly in relation to China which has a fixed exchange rate with the dollar and whose currency has been depreciating along with it.

A third view that has been recently put forward by a leading economic journal (Economic Times) is that RBI should pursue what it has referred to as a policy of "calculated volatility". It has been argued that the present policy of controlled volatility has provided virtually risk-less gain to market participants since the

rupee has been expected to appreciate substantially and continuously over the past few months. According to this view, in order to prevent excessive capital inflows during this period, RBI should have allowed the exchange rate to quickly "overshoot" the targeted exchange rate of say Rs.46.20 (or any other number) to say Rs.45.50. Thereafter, RBI should have allowed the rupee to depreciate slowly to be above the targeted number over a period of the next few months. In essence, this view is akin to a policy of fixed exchange rate within a wider band. An implicit assumption is that the level (whatever it is) is either already known or will be known to the market as it is approached. RBI's past experience does not suggest that these assumptions are valid. It should be recalled that there have been periods when rupee exchange rates have been relatively more volatile and movements have been sharper. However, during periods of sharper appreciation, instead of flows declining and demand for foreign currency rising, RBI noticed that actual market behaviour was the opposite. The opposite was true during periods of sharp depreciation.

Dr Bimal Jalan (2003), stated that a fixed exchange rate regime (even with a currency board) was clearly out of favour. He quoted the Brazilian, Argentinean and Asian crisis and said even a strong Board type arrangements of a fixed peg vis-à-vis the Dollar was found to be unviable. He said the dominant view for most countries - floating or flexible exchange rates - was the only sustainable way of having a less crisis prone exchange rate regime. In regard to the desirable degree of flexibility in exchange rates, opinions and practices vary. But a completely "free float" without intervention is clearly out of favour except in respect of a few global or reserve currencies like the Euro and the Dollar. Even in respect of these currencies, concerns are expressed at the highest levels when the movement is sharp in either direction. Studies by IMF and several experts also show that by far, the most common exchange rate regime adopted by countries including industrial countries, is not a free float. Most of the countries have adopted managed floats with no pre-announced path and Central Bank intervention periodically.



In view of the considerable turbulence and volatility faced by foreign exchange markets in several countries in the recent past, policy issues relating to the management of the external sector, particularly the appropriate exchange rate systems, have figured prominently in ongoing discussions on international financial architecture in various fora, such as the International Monetary Fund, the World Bank, Financial Stability Forum and the Bank of International Settlements. India has been participating in all these discussions along with Central Bank Governors and Finance Ministers of Industrial and other developing countries.

Floating rates, capital movement volatility, massive changes in technology and integration of worldwide markets across different time zones, are relatively new phenomena. India is still on the learning curve. Recent changes have brought tremendous benefits to India by removing capital and technological constraints to developments. As new horizons open, we are faced with new challenges on exchange rate volatility (Y.V. Reddy, 2004).

The study of Golakanath (2003) has recommended for exploring non-linear modelling technique to understand the exchange rate behaviour of the Rupee against the Dollar, but till now no study is available as recommended by him. This study after establishing the relationship between macroeconomic variables and the exchange rate of the Rupee against the Dollar using univariate and multivariate regression analysis, builds an exchange rate forecasting model.

3.3 Review of Literature on Corporate Risk Management

The modern finance theory (as reflected in the capital asset pricing model and the arbitrage pricing theory) regards hedging activities aimed at a reducing total corporate risk (measured by the variability of the firm's cash flows) as irrelevant. Under certain plausible conditions, the capital asset pricing models as well as the arbitrage pricing theory show that unsystematic (or diversifiable or unique) risks are not priced in the financial market. Put differently, unsystematic risk has no bearing on the required rate of return. Only

systematic risk (or market risk) is priced and, hence, has an influence on the required rate of return.

Since the price of systematic risk is identical for all the participants in the financial market, a firm does not benefit its shareholders by laying it off in the financial market. Thus, according to this line of reasoning, in an efficient market the expected net present value of any risk hedging activity like taking insurance cover or buying a forward contract is zero. As Alan C Shapiro and Sherid Titman say: "Management decisions to insure or hedge assets appear, at best, neutral mutations (having no effect on the value of the firm). At worst, such actions, to the extent they are costly, are viewed as irrational behaviour penalizing corporate stockholders". This argument implies that company-specific risks (or unsystematic risks) do not hurt the shareholders, as long as they do not jeopardize the existence of the firm.

Prasanna Chandra (1999), however, questioned the above view. Although unsystematic risk may have no bearing on the required rate of return in the financial market, unmanaged unsystematic risk can and often does hurt shareholders. In terms of the DCF model of firm valuation, unsystematic risk may lower the expected cash flows (the numerator in the DCF model), even though it has no influence over the discount rate (the denominator in the DCF model).

Why does higher total risk lower the expected cash flows of the firm? Other things being equal, a firm with a high total risk exposure is likely to face financial difficulties, which tend to have a disrupting effect on the operating side of the business. Inter alia, a distressed financial condition will detract from value because of adverse incentives, weakened commitment, and diminished tax shelters.

In today's world, managing corporate risks is a daunting task. In coping with this challenge corporate managers will have to bear in mind the following interrelated guidelines of understanding the firm's strategic exposure, employing a judicious mix of real and financial tools, proactively managing

uncertainty, aligning risk management with corporate strategy and learning when it is worth-reducing risk.
Richard Friberg (1999), in his book "Exchange Rates and the Firm" says, "exchange rate is part of wider macroeconomic risks, especially those relating to domestic interest rates, inflation rates and political developments. Individual firms ward off adverse effects of exchange rate fluctuations on their asset values and net profits by taking recourse to instruments of hedging – forwards, futures, swaps and options".

A number of studies have attempted to provide insights into the practices of risk management within the corporate sector. Reports by Price Waterhouse (1994, 1995) describe corporate practices in the wider area of treasury management. Glaum/Roth, 1993; Batten, 1993; Aabo, 1999; and Greenwich Treasury Advisors, 1999; focus on the exchange risk management practices of multinational corporations.

Bodnar, 1995, 1996, 1998; Grant/Marshall, 1997; Howton/Perfect, 1998 and Bodnar/Gebhardt, 1999; have reported on the use of derivatives for risk management in their papers. These empirical studies are interesting not only from an academic standpoint but they also provide managers with information on the current practices of other firms. This kind of information is valuable since it allows managers to critically assess and analyse their own strategies. Cohen/Wiseman (1997) explained which questions should be asked in this context: "Companies should use this information to assess where they stand in comparison with other companies. The findings of the studies do not necessarily represent best practice, but they should be used as a guide for a treasury to compare with other organisations and their practices.

Andrew P. Marshall (1999) surveyed the foreign exchange risk practices of 179 companies. The main objective of managing foreign exchange risk was found to be minimization of fluctuation in earnings and seeking certainty of cash flows. This survey established that companies placed more emphasis on transaction risk management.

Claudio Loderer and Karl Pichler (2000) surveyed 96 firms listed in Zurich Stock Exchange. This survey found that the firms were unable to quantify the currency risk profile. These firms failed to understand properly why currency risk reduces firm value. The results found in this survey raised many questions for future research. One of the most challenging was the reduction of economic exposure with on-balance-sheet instruments on the one hand and micro hedging of transaction exposure with currency derivatives on the other.

Martin Glaum (2000) surveyed 74 companies in Germany and found that the majority of the firms managed their transaction exposure. Most firms adopted a selective hedging strategy based on exchange rate forecasts (73%). Only a small minority of firms did not hedge foreign exchange risk at all (11%). A few companies hedged their transaction exposure completely (16%).

The studies cited above explain that there is a need for hedging the foreign exchange risk by corporates using the available derivative products, but there is no research study in India showing the hedging of risk by corporates and their methodology etc.

3.4 Research Gap

From the literature review on Capital Account Liberalization, exchange rate management and corporate risk management, it is clear that various studies have been made but the direction of these studies lack the following:

(i) Sequencing of Capital Account Convertibility and the pre- conditions required for Capital Account Convertibility in India.

(ii) Identification of various macroeconomic factors affecting exchange rate of the Rupee against the Dollar and the relationship of these factors with the exchange rates.

(iii) Exchange rate forecasting based on non-linear statistical models.

(iv) Survey of Indian companies for studying their foreign exchange risk management practices.

3.5 Justification for the study

Under the present condition of available literature and the gap in the existing studies, there is a need to have a detailed study, which should incorporate the sequencing of capital account convertibility and the pre-conditions required for capital account convertibility in India. There is a close link between capital account convertibility and the various macroeconomic factors affecting the exchange rate of the Rupee against the Dollar. The study aims to identify the macroeconomic factors affecting the exchange rates and the relationship between them. Further, there is a need to look into the recent volatility in the exchange rate of the Rupee against the Dollar. Exchange rate forecasting is attempted based on statistical models using the identified macroeconomic factors. There is a need to look into the foreign currency risk management practices of the Indian companies, which will help the companies manage their foreign currency risk in a better manner. Based on primary data collection through questionnaire survey, the study aims to help companies by suggesting measures for improving their foreign currency risk management.

3.6 Objectives of the Study

(1) To study the recommendations of the Tarapore Committee for Capital Account Convertibility, it's sequencing and the present status of implementation in India to identify macroeconomic factors affecting the exchange rate of the Rupee against the Dollar.

(2) To examine the recent volatility in exchange rates and to demonstrate its continuance based on simulation.

(3) To establish a relationship between Macroeconomic factors and Exchange rates for forecasting the Rupee-Dollar Exchange Rate.

(4) To study the foreign currency exposure risk management of selected Indian companies through a survey and interview.

(5) To suggest measures for handling foreign exchange exposure for Indian companies.

3.7 Scope of the Study

1) While studying the macroeconomic factors affecting the exchange rates, the study limits itself to the data for the period 1991 to 2004.
2) The study is confined to Rupee-Dollar only.
3) The companies covered are predominantly Chennai-based companies having exposure to foreign exchange on account of imports, exports or foreign currency loans.

3.8 Data Sources and Collection

Primary data from the corporates and secondary data from the handbook of statistics on the Indian economy, Reserve Bank of India, annual report of the Reserve Bank of India, the website of Reserve Bank of India viz. www.rbi.org.in, Center for Monitoring Indian Economy and the Federal Reserve Statistical Release of the US government are used for the study. The secondary data are very reliable and sound. Primary data collection was made through questionnaire survey on Chennai-based companies. The views of experts/knowledgeable people in the foreign exchange field namely Chief Financial Officers of companies, bankers and regulators with respect to foreign exchange risk management for Indian companies are also obtained through personal interviews.

3.9 Methodology

(a) Monte Carlo Simulation to demonstrate the volatility in exchange rates

The daily exchange rates of the Rupee against Dollar from January 1973 to November 2004 were studied to understand the behaviour of the exchange rates. The exchange rates have steadily depreciated from 1947 to June 2002. From July 2002, the rupee has turned volatile. Using Monte Carlo simulation the volatility of exchange rates is studied. The Monte Carlo simulation technique is a well-known technique that

uses random numbers generated from a uniform distribution and maps the relative frequency to the random numbers generated. Each time when a random number corresponds to a specific relative frequency, the exchange rate that is associated with that category is taken as the prediction for the next period. Monte Carlo simulation method is equally applicable when random numbers are generated from a standard probability distribution such as the normal distribution. In this case, the cumulative probability of the standard normal distribution is taken as the basis for predicting the exchange rate.

(b) Exchange Rate Forecasting

The forecasting of the exchange rate of the Rupee against the Dollar using a forecasting model based on multivariate regression analysis is attempted. Macroeconomic data from 1991 to 2004 have been used for this purpose. For the empirical analysis of exchange rates (the dependent variable) and nine other macroeconomic variables (independent variables) for the years 1991 to 2004, the univariate and multivariate regression analysis are used. The data analysis and results are discussed in the chapter-5 on exchange rate volatility and it's forecasting.

(c) Primary data collection through questionnaire survey

125 Chennai-based companies were identified, which had exposure to foreign exchange on account of imports, exports or foreign currency loans from the database of Center for Monitoring Indian Economy. Structured questionnaires were sent to the Chief Financial Officers of these companies. 54 responses were received and the analysis of the above is covered in Chapter-6, Implications of Exchange Rate Management for Indian Companies. The Statistical Package for Social Sciences (SPSS) was used for the above analysis.

The macroeconomic variables selected for data analysis are: -

(1) Exchange Rate
(2) Bank Rate

(3) Balance of Payments
(4) External Debt
(5) Foreign Direct Investment and Foreign Institutional Investment in India
(6) Foreign Exchange Reserves
(7) Gross Domestic Product
(8) Fiscal Deficit
(9) Inflation
(10) US Federal Interest Rate

3.10 Operational Definitions:

The above mentioned macroeconomic variables are defined below: -

(1) Exchange Rate:

Exchange Rate is the price (rate) at which one currency is exchanged for another currency. It is the number of domestic currency units per US Dollar.

(2) Bank Rate:

Bank rate is the rate at which the Central Bank (Reserve Bank of India) lends to the banking system in India.

(3) Balance of Payments (BOP):

BOP is a tabulation of the credit and debit transactions of a country with the foreign countries and international institutions during a specific period. It broadly consists of:

I. Current Account

(a) Exports of Goods
Imports of Goods
} Net Visible Balance of Trade in Goods

(b) Trade in Services

Government
Transport
Travel
Financial and Other Services
} Net Invisible Balance of Trade in Services

(c) Other Current Accounts transactions
Government
Others

(a) + (b) + (c) Current Account Balance

II. Capital Account
Investments in India
Investments Overseas
Other Capital transactions

III. Foreign Exchange Reserves

IV. Errors and Omissions

I + II + III + IV = Overall Balance

(4) External Debt

External Debt is the total amount of borrowings outstanding at the end of each year and includes the following:

(a) Government borrowings from Bilateral and Multilateral agencies (both concessional and non-concessional)

(b) Government borrowings from International Monetary Fund

(c) Borrowings of the public sector, financial institutions and commercial banks

(d) Trade credit (buyers' credit and suppliers' credit)

(5) Foreign Direct Investment (FDI) and Foreign Institutional Investment (FII)

The Balance of Payments manual of the International Monetary Fund has defined FDI as "The Category of International Investment that reflects the objective of obtaining a lasting interest by a resident entity in one economy, in an enterprise, resident in another economy" (IMF Balance of Payments Manual, 1993).

According to the World Trade Organization "FDI occurs when an investor based in one country (the home country) acquires an asset in another country (the host country) with the intent to manage that asset". The management dimension is "what distinguishes FDI from portfolio investment in stocks, bonds and other financial instruments (FII Investments)"

(6) Foreign Exchange Reserves

Foreign Exchange Reserves represent claims on another country held in the form of currency of that country, interest bearing bonds or gold.

(7) Gross Domestic Product (GDP)

Gross Domestic Product is a measure of the total flow of goods and services produced by a country over a specified time period, normally a year or a quarter. GDP is obtained by valuing outputs of goods and services produced in the country at market prices and then aggregating them.

All intermediary goods are excluded and only goods used for final consumption or investment goods (Capital Goods) or changes in stocks are included.

The income arising from investments and possessions owned abroad is not included in GDP, and only the value of flow of goods and services produced in the country is estimated, the word "domestic" is used to distinguish it from the Gross National Product.

(8) Fiscal Deficit

Fiscal Deficit is calculated by taking the total expenditure of the government and reducing from it the total revenue receipts and other receipts excluding the borrowings of the government. It is the budget deficit plus the borrowings of the government.

(9) Inflation

Inflation is the increase in the general level of prices. CPI means Consumer Price Index, which measures the increases in the prices at the consumer level.

(10) US Federal Interest Rate

This is the rate at which the Central Bank in the USA (Federal Reserve Bank) lends to the banking system in the US.

3.11 Hypothesis Development

Hypothesis 1: **Bank Rate and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between bank rate and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the bank rate and exchange rate of the Rupee against the Dollar.

Hypothesis 2: **Balance of Payments and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Balance of Payments and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Balance of Payments and exchange rate of the Rupee against the Dollar.

Hypothesis 3: **External Debt and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the External Debt and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the External Debt and exchange rate of the Rupee against the Dollar.

Hypothesis 4: **FDI and FII and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the FDI and FII inflows and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the FDI and FII inflows and exchange rate of the Rupee against the Dollar.

Hypothesis 5: **Foreign Exchange Reserves and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Foreign Exchange Reserves and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Foreign Exchange Reserves and exchange rate of the Rupee against the Dollar.

Hypothesis 6: **Gross Domestic Product and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Gross Domestic Product and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Gross Domestic Product and exchange rate of the Rupee against the Dollar

Hypothesis 7: **Fiscal Deficit and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Fiscal Deficit and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Fiscal Deficit and exchange rate of the Rupee against the Dollar

Hypothesis 8: **Inflation (Based on CPI) and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the Inflation (Based on CPI) and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the Inflation (Based on CPI) and exchange rate of the Rupee against the Dollar

Hypothesis 9: **US Federal Interest Rate and Exchange Rate of the Rupee against the Dollar**

H_0: There is no relationship between the US Federal Interest Rate and exchange rate of the Rupee against the Dollar.

H_1: There is a relationship between the US Federal Interest Rate and exchange rate of the Rupee against the Dollar

3.12 Limitations of the study

(i) Predominantly Chennai based companies only were considered in our sample.

(ii) Only the Rupee against Dollar exchange rates has been taken for the study.

(iii) The macroeconomic data are limited to the period 1991-2004.

(iv) Political factors and speculation have not been considered in the study. These factors have shown influence on exchange rates from time to time.

(v) The companies who have responded are very limited in numbers and do not represent all the sectors of the economy.

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CHAPTER 4

TARAPORE COMMITTEE RECOMMENDATIONS AND ITS PRESENT STATUS

In this chapter, the recommendations made by the Tarapore Committee for capital account convertibility and its present status of implementation in India is studied. The major pre-conditions laid down by the committee for capital account convertibility and the current position as of November 2004 are summarized. Based on this and the literature review, the macroeconomic factors affecting the exchange rate of the Rupee against the US Dollar are identified.

The Union Finance Minister Shri P.Chindambaram in his budget speech for 1997-98 had indicated that the regulations governing foreign exchange transactions needed to be modernized and replaced by a new law consistent with the objective of progressively liberalizing capital account transactions.

To quote: "I believe that the time has come for preparatory work towards capital account convertibility. This is a cherished goal. It is also a matter of great sensitivity. Hence, I shall not make any commitment. For the present, I am asking RBI to appoint a group of experts to lay out the road map towards capital account convertibility, prescribe the economic parameters, which have to be achieved at each milestone and work out a detailed time table for achieving the goal. I believe the appointment of such a group will send a powerful signal to the world about our determination to join the ranks of frontline nations".

Dr. C. Rangarajan, Governor, Reserve Bank of India, on February 28, 1997 appointed a committee under the chairmanship of Shri S.S.Tarapore with four other members.

4.1 The Terms Of Reference

The terms of reference to the committee was to recommend measures that should be taken to achieve full Capital Account Convertibility and to specify the sequence and time frame in which such measures are to be taken.

The Committee after examining the international experience of various countries and also looking into India's macro and micro economic conditions suggested the following far reaching recommendations

Those recommendations, which are having direct or indirect impact on Capital Account Convertibility, are discussed below:

1. The Committee was of the view that an open capital account has several benefits: the availability of a larger capital stock to supplement domestic resources and thereby higher growth, reduction in the cost of capital and improved access to international financial markets. Capital Account Convertibility (CAC) allows residents to hold an internationally diversified portfolio, which reduces the vulnerability of income streams and wealth to domestic real and financial stocks, lower funding costs for borrowers and prospects of higher yields for savers. An associated gain from CAC is the dynamic gains from financial integration. Allocative efficiency improves as a result and that can stimulate innovation and improve productivity. CAC provides the impetus for domestic tax regimes to rationalize and converge to international tax structures. This removes inducements for domestic agents towards evasion and capital flight. The Committee emphasises that capital controls turn progressively ineffective, costly and even distortive.

2. The Committee recognized that the institution of financial sector reforms in India brought into the open weaknesses, which had been in the system for a long time. The introduction of CAC requires more proactive policy measures as an open capital account could bring these weaknesses under sharper focus. CAC would impose a strong discipline upon the financial system and would expedite the early rectification of infirmities in the system and lead to widening/deepening of markets to enable the spreading/distribution of risks.

4.2 The International Experience

The Committee's survey of the international experience with CAC revealed that countries, which initiated the move to CAC on the basis of strong fundamentals, were able to modulate the pace of instituting CAC without undertaking large and dramatic shifts in the stance of macroeconomic policies. Furthermore, these countries were less vulnerable to backtracking and the re-imposition of controls. Countries with weak initial conditions were constrained to adopt drastic macroeconomic policies to facilitate the move to CAC. Some of these countries had to face interruptions and re-introduce capital controls in the evolution of CAC.

The Committee noted that most countries considered a strong balance of payments position as a necessary precondition for the move to CAC and universally built up reserves. The Committee's survey of the country experiences showed that strengthening of the financial system emerged as the most important precondition for CAC. Fiscal consolidation was another important precondition for CAC among all countries. An important concomitant in the process of CAC was the conduct of an appropriate exchange rate policy.

In the specifics of capital account liberalization, in the countries studied by the Committee, restriction on inflows and related outflows by non residents and residents were removed first, followed by relaxation of restrictions on outflows by residents. Among residents, corporates and non-banks usually received preferential treatment, followed by commercial banks and individuals. Most countries maintained or were required to impose some controls on capital inflows during the transition to CAC.

4.3 Preconditions/Signposts for Capital Account Convertibility

Based on an assessment of macroeconomic conditions, the Committee was of the considered view that the time was appropriate to initiate a move towards CAC. The Committee, however, recognized, that the initial conditions do contain certain weaknesses and the entrenchment of preconditions can be achieved in the Indian context only over a period of time. The establishment of preconditions needed to be viewed as processes rather than as one-time indicators. The Committee therefore recommended that the implementation of CAC be spread over a three-year period 1997-98, 1998-99 and 1999-2000. The Committee stressed that implementation of measures towards CAC should be sequenced along with the authorities making an assessment of the progress towards the attainment of the preconditions/signposts stipulated for the relevant year and depending on this assessment the implementation of measures could be accelerated or decelerated.

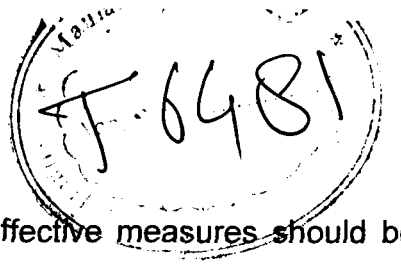
Fiscal consolidation, a mandated inflation target and strengthening of the financial system should be regarded as crucial preconditions/signposts for CAC in India. In addition, a few important macroeconomic indicators should also be assessed on an on-going basis. These are: the conduct of exchange rate policy, the balance of payments and the adequacy of foreign exchange reserves.

4.4 Fiscal Consolidation

The Committee recommended a reduction in the GFD/GDP ratio from a budgeted 4.5 percent in 1997-98 to 3.5 percent in 1999-2000. The reduction in the Centre's gross fiscal deficit should be accompanied by a reduction in the States' deficit and as a reduction in the quasi-fiscal deficit. The practice of financing the amortization of Government market loans out of fresh borrowings is clearly unsustainable and this practice would inevitably result in a crisis situation. The 10th Finance Commission recommended the institution of a Consolidated Sinking Fund (CSF) for the public debt and the Committee while strongly endorsing this recommendation, stressed that the institution of a CSF is an important ingredient in the achieving of the precondition on fiscal consolidation.

Monetary management is often clouded by the monetary authorities' concern about the Government's borrowing programme and therefore, the Committee recommended that steps should be initiated to separate the debt management policy from monetary management and to this effect the Government should set up its own Office of Public Debt. The RBI should totally eschew from participating in the primary issues of Government borrowing.

Transparent and internationally comparable procedures for fiscal accounting should be adopted so as not to blur the true magnitude of the GFD/GDP ratio as also the constituents of the budget as a whole. The Committee recommended that the Government of India should consider an early introduction of a system of fiscal transparency on the lines of the New Zealand Fiscal Responsibility Act.



4.5 Mandated Inflation Rate

In the context of the move towards CAC, effective measures should be taken to evolve a more specific commitment on the inflation rate. The Committee recommended that there should be an early empowering of the RBI on the inflation mandate. There should be a medium-term inflation mandate approved by Parliament and only Parliament should alter that mandate. Once the mandate is given, the RBI should be given freedom to use the instruments at its command to attain the medium-term inflation target. Intensification or withdrawal of public intervention in price formation or a shock in the real sectors could warrant a review of the mandate but there should be clear and transparent guidelines on the circumstances under which the mandate could be changed. The Committee recommended that the mandated rate of inflation for the three-year period 1997-98 to 1999-2000 should be an average of 3–5 percent. Such a mandate would be necessarily needed to provide for greater independence for the RBI.

4.6 Consolidation in the Financial Sector

The Committee recommended that interest rate should be fully deregulated in 1997-98 and there should be total transparency to ensure that there are no formal or informal interest rate controls.

The strengthening of the financial system is the most important precondition to the move to CAC. Noting the systemic dangers of some of the weak banks growing at rates faster than the system, the Committee recommended that the weak banks should be converted into what are called `narrow banks'. The incremental resources of such banks should be restricted only to investments in Government securities and in extreme cases of weakness not only should such banks not be allowed to increase

their advances but there would need to be a severe restraint on their liability growth. Such measures are unavoidable if the financial system is to be safeguarded during the move towards CAC.

The Committee recommended that the financial institutions should also be made to function with a targeted mandate to reduce the quantum of NPAs within a time-bound programme.

4.7 Exchange Rate Policy

The RBI should have a Monitoring Exchange Rate Band of +/-5.0 percent around the neutral Real Effective Exchange Rate (REER). The RBI should ordinarily intervene as and when the REER is outside the band. The RBI should ordinarily not intervene when the REER is within the band. The RBI could, however, use its judgment to intervene even within the band to obviate speculative forces and unwarranted volatility. The Committee further recommended that the RBI should undertake a periodic review of the neutral REER, which could be changed as warranted by fundamentals.

The Committee stressed that credibility of the exchange rate policy would be vital in the context of CAC and to this extent there must be transparency in exchange rate policy: (i) the neutral REER i.e. the base period should be announced (ii) the REER Monitoring Band should be declared (iii) the REER should be published on a weekly basis with the same time lag as the publication of the reserves and (iv) changes in the neutral REER should be made public.

The Committee recommended that as part of exchange rate management, greater attention should be focused on ensuring that the forward exchange markets reflect the interest rate differentials.

4.8 Balance of Payments

The Committee recognized that in view of the growing degree of integration of the Indian economy, the size of the current account deficit (CAD), which can be sustained without encountering external constraint, is a function of the degree of openness of the economy, which can be defined in terms of the ratio of current receipts (CR) to GDP. Accordingly, the Committee recommended that, as a broad rule of thumb, over the three-year period 1997-98 to 1999-2000, external sector policies should be designed to ensure a rising trend in the CR/GDP ratio from the present level of 15 percent and the endeavour should be to reduce the debt service ratio gradually from 25 percent to 20 percent. The CAD/GDP ratio would need to be consistent with the above parameters.

4.9 Adequacy of Reserves

In the context of a move to CAC, capital flows would have a more significant effect on the balance of payments and conventional indicators in terms of import cover does not provide a good indicator of the adequacy of reserves. As a broad guideline, the Committee recommended that the following four indicators be used in the Indian context for evaluating the adequacy of reserves:

(i) Reserves should not be less than six months of imports; this ratio is higher than earlier norms as it would take into account the uncertainties and volatility in capital flows, which can arise in the context of a move towards CAC. Under this formulation, the foreign exchange reserves required would be about US $22 billion.

(ii) Reserves should not be less than three months of imports plus 50 percent of debt service payments plus one month's exports and imports to take into account the possibilities of leads and lag. On this basis the requirement would be US $24 billion. When more

accurate data on leads and lags are available, the requirement for resources could be adjusted appropriately.

(iii) The short term debt and portfolio stock which is equivalent to 70 percent of the level of reserves should be lowered to 60 percent by using a formulation that incremental short term debt and portfolio liabilities should be accompanied by equivalent increase in reserves which would ensure that this ratio would decline to the desired extent. On this basis the required reserves would be US $31 billion.

(iv) The net foreign exchange assets to currency ratio (NFA/Currency ratio) should be prescribed by law at not less than 40 percent. The requirement would be about US $26 billion.

4.10 Strengthening of the Financial System

The Committee recommended that a uniform regulatory system was needed for banks and non banks particularly FIs in relation to prudential norms, market participation, reserve requirements and the interest rate regime.

In the context of a move towards CAC, the Committee recommended that reserve requirements on banks' non-resident liabilities and overseas borrowings should be at least on par with those on domestic liabilities. Furthermore, as one of the instruments for moderating capital inflows, the RBI should use the instrument of CRR to impose higher reserve requirement on non-resident liabilities including overseas borrowings.

The Committee was of the view that risk management is a critical area, on which banks and non-banks (Including FIs) must bestow immediate attention. Towards this, the Committee recommended that:

(i) RBI should prescribe prudential norms for rupee mismatches.

(ii) Banks should move to 100 percent mark-to-market valuation of Investments

(iii) Banks should adopt best practices of risk management suggested by the Expert Group on Foreign Exchange markets (Chairman Shri O.P. Sodhani)

(iv) Banks should follow international accounting and disclosure norms

(v) Capital prescriptions should be stipulated for market risk.

A successful move to CAC required an effective supervisory regime, which would be able to pick up the warning signals and weaker entities would be required to be monitored more closely and frequently.

As risks faced by the financial sector were much higher in developing countries, the Committee recommended that the RBI should consider the imposition of even more stringent capital adequacy standards than the Basle norms and income recognition and asset classification norms should be tightened expeditiously. There could also be steeper capital requirements for banks with higher level of NPAs.

The Committee was of the view that much more was needed to be done to enable public sector banks to operate with a greater degree of autonomy to cope with the rapidly changing environment. The Committee recommended that the more efficient public sector banks were to be allowed, nay actively encouraged, breaking away from the pack and their activities should not be hemmed in by concerns for the weak banks. The Committee recommended that the FIs should also be given a greater degree of operational freedom within the framework of strict prudential norms. While issues of autonomy are often posed as one of the regulator/owner giving freedom to the entities, there is also the issue of

entities taking on their rightful autonomy. The Boards should be so constituted that they effectively operate as autonomous units. The Committee emphasized that autonomy is never given, it is always earned.

The Committee recommended that a comprehensive banking legislation and an enforcement machinery be put in place not only to reduce the quantum of NPAs but also to ensure that such framework serves as a deterrent for future defaulters. In the context of CAC, a comprehensive review of all banking and finance related enactments needs to be taken up, which have engendered inflexibilities/rigidities in the system.

The Committee was of the view that without a greater degree of technology absorption, the market participants will be ill equipped to build strong risk management systems and management information systems. Up-gradation of technology can pave the way for an efficient payment and settlement mechanism, which will strengthen the financial system considerably.

The Committee underscored the need for strong initiatives on the part of market participants to upgrade their human resource skills for enabling Indian financial entities to compete meaningfully with their counterparts abroad. In order that they attract the best talent and expertise, individual banks and FIs should have freedom to determine their personnel policies including recruitment and wage policies without being constrained by any rigidity.

4.11 Timing and sequencing of measures

The Committee recommended that alongside further measures of liberalization of capital inflows it was desirable to simultaneously liberalize controls on outflows as a means of contending with capital inflows. An

early albeit cautious beginning to allow capital outflows is desirable as the system is attuned to a totally rigid ban on certain outflows and the system needs to develop confidence that some capital outflows, far from being destabilizing, would be conducive to the overall efficiency of deployment of resources.

The Committee recognized that while the timing and sequencing of CAC proposed can be undertaken under the existing laws and regulations relating to foreign exchange, they would be facilitated by the proposed change in the legislative framework governing foreign exchange transactions.

The timing and sequencing of measures for liberalization of capital outflows and inflows are set out in a tabular form given in Table - 4.1.

Table - 4.1

Implementation of Tarapore Committee recommendations and the current position after passing through the three phases recommended by the committee

($ indicates US dollars)

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
COPORATES/BUSINESSES					
A. Corporates/Business – Residents					
1. Issuing foreign currency denominated bonds to residents (only rupee settlement) and investing in foreign currency denominated bonds and deposits (only rupee settlement)	Not permitted	To be permitted without any ceiling	Same as Phase I	Same as Phase I	Not permitted
2. Financial capital transfers abroad including for opening current/ chequeable accounts	Not permitted	$25,000 per annum	$50,000 per annum	$100,000 per annum	Upto $25000 permitted per annum
3. Accessing capital markets abroad through GDRs & ADRs/other forms of equity issues	Permitted individually by Government. Approval under FERA given by RBI	No approval to be taken from RBI/Government. Reporting within 30 days from close of issue.	Same as Phase I	Same as Phase I	Permitted as per GOI guidelines under automatic route, subject to complying with prescribed conditions.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
4. External Commercial Borrowings (ECB)	ECB are subject to overall ceiling with sub- ceilings as indicated below: (i) Import linked short- term loans (Buyers/ Suppliers credit) for less than 3 years (i.e. 35 months) approved by RBI subject to sub-ceiling fixed by Government. (ii) Loans beyond 35 months approved by Government. (iii) US $ 3 million for a minimum period of 3 years for business related expenses including financing rupee cost of the project-approved by RBI within sub-ceiling fixed by Government. (iv) All other loans are approved by Government (generally for financing requirements of infrastructure projects, export oriented units, etc.).	Queuing for purposes of implementing ceiling on ECB while ensuring that a few very large borrowers do not crowd out relatively smaller borrowers. No restrictions on end use of funds. Loans for periods with average maturity of 10 years and above to be kept outside the ceiling.	Same as Phase I except for loans with average maturity of 7 years and above to be outside ceiling.	Same as Phase II	Upto $20 million Three-Year Maturity and upto $500 million – Five Year Maturity under automatic route for infrastructure projects. Above these limits, RBI approval is needed.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
5. Foreign Currency Convertible Bonds/Floating Rate Notes	Permitted individually by Government within overall ECB ceiling.	To be within ECB ceiling with same procedure viz. queuing vide item 4	Same as Phase I	Same as Phase I	Automatic approval as per GOI guidelines.
6. Loans from non residents	Allowed by RBI on a case-by-case basis for loans from NRIs on non-repatriable basis with restrictions on interest payment and end-use.	To be allowed to borrow up to $250,000 per entity with payment of interest not exceeding LIBOR without restriction on period of loan, use of funds and repatriation of loan/interest.	To be allowed to borrow up to $500,000 per entity with payment of interest not exceeding LIBOR without restriction on period of loan, use of funds and repatriation of loan/interest.	To be allowed to borrow up to $1 million per entity with payment of interest not exceeding LIBOR without restriction on period of loan, use of funds and repatriation of loan/interest.	As per ECB guidelines for borrowing foreign currency.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
7. Joint ventures/wholly owned subsidiaries abroad	The RBI clears proposals for investments up to US $4 million. The extent of outflow is dependent upon the export performance of the Indian promoter and capability for repatriation by way of dividend, etc. within a period of five years. A Special Committee clears cases not covered by these criteria. Recently, an announcement has been made in the Budget that balances in EEFC accounts can be used for investments upto US $15 million without the specific approval of RBI.	Direct investments abroad to be allowed for ventures up to $50 million by Ads subject to transparent guidelines to be laid out by the RBI. Above $ 50 million through Special Committee. The current stipulation on repatriation of earnings by way of dividend etc. within a specified time period should be removed. JVs/ WOSs can be set up by all parties and not restricted only to exporters/exchange earners.	Same as Phase I	Same as Phase I	Companies can invest in JV / Wholly owned subsidiaries upto $100 million under automatic route. Above $100 million RBI working group approval is required.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
8. Project Exports	Indian project exporters are required to approach the RBI for prior approval for variety of purposes while executing the projects abroad.	Requirement of prior approval by the RBI may be dispensed with subject to reporting to the RBI.	Same as Phase I	Same as Phase I	Prior approval from ADs/EXIM Bank for upto $100 million and above $100 million working group / RBI approval required.
9. Establishment of offices abroad	Powers given to ADs to allow remittances for exporters with an average annual export turnover of Rs.150 lakhs and above to open representative/non-trading offices. Further, EEFC account holders have been permitted to utilize their EEFC balances without any restriction for establishing any type of offices. Other cases require RBI approval.	Any corporate entity may open offices abroad without the need for prior approval from RBI. Capital expenditure towards opening of the offices and current expenditure for maintenance could be subject to overall value limits to be allowed by ADs.	Same as Phase I	Same as Phase I	Permitted under general permission given by FEMA Act, 1999.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
10. EEFC accounts for exporters and exchange earners	50% for EOUs and 25% for others – restrictions on use of funds for current account and permitted capital account transactions.	100% of earnings for all exporters/exchange earners to be allowed to be held in EEFC accounts in India. Use of funds allowed for current and permitted capital account transactions with cheque writing facility.	Same as Phase I	Same as Phase I with additional provision that EEFC accounts can be held with banks outside India at the option of the exporter and the exchange earners.	Permitted according to entitlement for EOUs, status holders, EPZ and STPI Units upto 100%. Others upto 50%.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
B. Corporates – Non Residents (including OCBs)					
1. Foreign Direct Investment (FDI)	Currently OCBs are allowed facilities similar to NRIs. Other corporates are allowed to invest up to various proportions with RBI/ Government approval under the FDI policy of the Government.	Prior approval of RBI not required for FDI. Reporting by ADs to the RBI	Same as Phase I	Same as Phase I	Allowed under automatic route as per GOI policies. OCB, initially allowed, now banned.
2. Portfolio Investment in India through stock exchange in shares/ debentures.	Allowed within the 24% limit (can be increased to 30% at the option of the company), which includes portfolio investment by NRIs, FIIs and OCBs subject to approval by the RBI, which is valid for a period of five years. The investment restricted to 1% by individual NRIs/ OCBs and 10% by individual FIIs. Corporates, other than OCBs and FIIs, are not permitted.	To be allowed to all non-residents without prior approval by RBI. Designated ADs should be required to report to the RBI.	Same as Phase I	Same as Phase I	Allowed subject to individual / group ceilings and sectoral caps.

Item	Position as of April 1997	Phase I 1997-98	Phase II 1998-99	Phase III 1999-2000	November 2004 Current Position
3. Disinvestment	Disinvestment as approved by the RBI except where sales are made through stock exchange under portfolio investment scheme.	RBI approval to be dispensed with.	Same as Phase I	Same as Phase I	As approved by RBI in April 1997.

A three-year road map was outlined with Phase I (1997-98), Phase II (1998-99) and Phase III (1999-2000). Concomitant measures for the development and integration of the foreign exchange, money and securities markets were also set out. Some of the important measures, which are applicable to corporates, are as follows:

A. Corporate/Business – Residents (Position as of November 2004)

(i) Financial capital transfer abroad including for opening of current account and chequeable accounts - upto $25000 permitted.

(ii) Accessing capital markets abroad through GDR and ADRs - permitted as per GOI guidelines under automatic route, subject to complying with prescribed conditions.

(iii) External Commercial Borrowing – Upto $20 million for three-year maturity and upto $500 million for five-year maturity under automatic route for infrastructure projects permitted.

(iv) Foreign Currency Convertible Bonds/Floating Rate Notes – Permitted as per automatic approval of GOI.

(v) Joint Ventures/wholly owned subsidiaries abroad – Companies can invest upto $ 100 million under automatic route and above $100 million RBI working group approval is required.

(vi) Project Exports – Prior approval from ADs/EXIM Bank upto $100 million and above $100 million, working group of RBI approval is required.

(vii) Establishment of Offices abroad – Permitted under general permission given by FEMA Act, 1999.

(viii) EEFC Accounts for Exporters and Exchange Earners – Permitted according to entitlement for EOUs, status holders, EPZ and STPI Units upto 100 per cent. Others upto 50%.

B. Corporates – Non Residents (including OCBs) (Position as of November 2004)

(i) Foreign Direct Investment (FDI) – Allowed under automatic route as per GOI policies. OCB, initially allowed, now not permitted.

(ii) Portfolio Investment in India through stock exchanges in shares/debentures – Allowed subject to individual / group ceilings and sectoral caps.

(iii) Disinvestment – As approved by RBI except where sales are made through stock exchange under portfolio investment scheme.

4.12 Summary of major pre-Conditions and the current position as of November 2004

1. Gross fiscal deficit to GDP ratio to come down from a budgeted 4.5% in 1997-98 to 3.5% in 1999-2000. In November 2004, it was still at 5%.

2. A consolidated sinking fund has to be set up to meet the Government's debt repayment needs; to be financed by the increase in RBI's profit transfer to the Government and disinvestments proceeds. As of now, it is not yet done. Fiscal Responsibility Act, 2003 has been passed to reduce government's borrowings.

3. Transparent and globally comparable procedures for fiscal accounting need to be implemented.

4. Inflation rate should remain between an average 3.5% for the three-year period 1997-2000. It was around 7.5% in November 2004.

5. Gross NPAs of the public sector banking system needs to be brought down from the present 13.7% to 5% by 2000 and at the same time, average effective CRR needs to be brought down from the 10% level to 3% level. The Gross NPAs to advances of public sector banks as of 2003 are at 9.4% and Gross NPAs to total assets of the public sector banks are at 4.2%. The net NPAs to total advances of public sector banks as of 2003 are at 4.5% and net NPAs to total assets of the public sector banks are at 1.9% (RBI Annual Report, 2003).

6. RBI should have a Monitoring Exchange Rate Band of plus/minus 5% around a neutral Real Effective Exchange Rate. RBI should be

transparent about the changes in REER. Currently, RBI is tracking the REER, but it does not have any target rate in mind nor any band within which the rates should move.

7. External sector policies should be designed to increase current receipts to GDP ratio and bring down the debt servicing ratio from 25% to 20%. This has been achieved. Current receipts to GDP ratio is 18.7% and debt service ratio is at 14.7%.

8. Indicators should be used for evaluating adequacy of foreign exchange reserves to safeguard against any contingency. Plus, law should prescribe a minimum net foreign asset to currency ratio of 40%. Currently, our foreign exchange reserves are about $ 126 billion as of November 2004 and they are quite adequate. Foreign asset to currency ratio is more than adequate at 130%.

4.13 Chapter Summary

The Management of the external sector has been one of the success stories of India in the last decade. The country has completed the first step towards full-float of the Rupee by allowing Foreign Direct Investment and Foreign Institutional Investment and the investors can bring in and take out money from the country. The second stage of allowing companies and individuals to borrow and invest in Foreign Exchange has been initiated but not completed in full. The country has comfortable Foreign Exchange Reserves (126 billion Dollars as of November 2004) and a healthy Balance of Payments situation.

India needs to bring down the gross fiscal deficit to GDP Ratio from the present 5% to 3.5%. Inflation should be contained from the current 7.5% to 3.5%. GDP should grow consistently at a growth ratio of 8% to 10%. If the above are achieved, India will be ready for full convertibility of the

capital account. Based on the recommendations made by the Tarapore Committee and the analysis made, the following 9 factors, which are very important for capital account convertibility and which have influence on the exchange rate of the Rupee against the Dollar are identified as the Balance of Payments position, Inflation, Bank rate, Fiscal deficit, Gross Domestic Product, Foreign Exchange Reserves, External Debt, Foreign Direct Investment and Foreign Institutional Investment and US Federal Interest Rate. In the next chapter, Exchange Rate Volatility and its forecasting, Monte Carlo simulation method is used to demonstrate the exchange rate volatility. The relationship between the nine identified macroeconomic factors and the exchange rate of the Rupee against the Dollar is studied and a model for forecasting exchange rate is developed, using multivariate regression analysis.

References:

1. Union budget speech of 1997-98 from GOI Budget Papers.
2. Tarapore committee report,1997.
3. RBI Circulars and Web site rbi.org.in

CHAPTER - 5

Exchange Rate Volatility and its Forecasting

In this Chapter, the daily exchange rates for the Rupee against the US Dollar for the period 1973 to 2004 are studied and it is found that they have followed a linear depreciating path from January 1973 to June 2002. From July 2002, they have turned volatile. Using simulation, the risk of leaving open the foreign currency exposure of companies is demonstrated. This calls for forecasting of exchange rates. Based on the identified nine macroeconomic factors, which are very important for capital account convertibility and which have influence on the exchange rate of the Rupee against Dollar, this chapter concentrates on examining the relationship between the selected nine macroeconomic factors and the exchange rate. An exchange rate forecasting model is built based on the exchange rate (dependent variable) and the nine macroeconomic variables (independent variables), based on the data for the years 1991 to 2004

5.1 The Recent volatility in Exchange Rates:

For more than five decades, the Rupee has been steadily depreciating from the level of Rs.2.4 per US Dollar prior to 1947 to Rs.49.07 in June 2002. From July 2002 onwards the Rupee has appreciated from Rs. 49.07 per US Dollar to Rs.43.40 per US Dollar as of March 2004. From April 2004 the Rupee has again started depreciating against the US Dollar and reached the level of Rs.46.16 per US Dollar on 30th September 2004. On 7th December 2004 it reached a level of Rs.43.70. The Indian Rupee is on a roller coaster ride. At Rs.43.4 to a U.S. Dollar as on 31st March 2004, the Rupee had appreciated by as much as 11.55 percent against the Dollar over July 2002 levels. Again, it has depreciated to the level of 46.16 as of 30th September 2004, a depreciation of 6.36 percent. It has again appreciated to 43.70 levels as of 7th December 2004, an appreciation of 5.32 percent. There has been enormous volatility. An intra day swing by 1 percent has become routine. A couple of years ago, this possibility would have been difficult

to envisage. Interestingly, following the introduction of the Liberalized Exchange Rate Mechanism (LERM) by the Reserve Bank of India in March 1993, the Rupee experienced remarkable tranquility for an unbroken stretch of 27 months till July 1995. Overall, instances of the Rupee appreciating against the Dollar have been few and far between. Hence, the current strengthening of the Rupee against the Dollar and its subsequent depreciation over a short period of three months is noteworthy for the volatility in the exchange rate of Rupee - Dollar.

The Monte Carlo simulation technique is used to study this recent phenomenon of currency volatility.

5.2 Monte Carlo simulation to demonstrate the volatility in exchange rates

The Monte Carlo simulation technique is a well-known technique of simulation that uses random numbers generated from a uniform distribution and maps the relative frequency to the random numbers generated. Each time when a random number corresponds to a specific relative frequency, the exchange rate that is associated with that category is taken as the prediction for the next period. Monte Carlo simulation method is equally applicable when random numbers are generated from a standard probability distribution such as the normal distribution. In this case, the cumulative probability of the standard normal distribution is taken as the basis for predicting the exchange rate. The following are the steps followed: -

Monte Carlo simulation - Method 1: (Method 1 is where the randomized variation i.e. difference between maximum and minimum in the observed distribution is used.)

1. The range from the maximum and the minimum number in the given distribution of past exchange rates is computed. In this case, daily exchange rates have been used in for the period from January 2002 to November 2004.

2. A set of random numbers was generated by using the Rand function in excel and linked to the variation (range) to obtain a randomized tolerance value.

3. This number is added to the minimum rate to obtain the simulated rate of exchange.

4. The mean and the standard deviation of the simulated distribution of exchange rates have been derived. This forms the basic probability distribution of exchange rates from which one can predict the probability of any given exchange rate.

5. For determining the probability of a given exchange rate or a range of exchange rates, the Z transformation (standardized normal variate) is performed on the given exchange rate.

6. The Z values are used to refer the normal distribution table or using the paste function of Microsoft Excel to obtain the probability associated with the given exchange rates.

Observations

The results under this method are as follows:

Expected Exchange Rate	Probabilities
44	91.54%
45	77.53%
46	55.47%
47	31.52%
48	13.57%

Monte Carlo simulation-Method 2(relative frequency mapping)

The following are the steps followed in the simulation model of Monte Carlo method 2: (Method 2 is where the relative frequency of the exchange rates as the estimator of probability are used).

1. The relative frequency of exchange rates from the past data is computed.
2. The probability based on relative frequency is computed.
3. Cumulative probability is computed.
4. The random numbers (say 2000 trials) are generated.
5. Using the random numbers, the distribution of exchange rates based on the probability weightage is generated.
6. The mean and standard deviation of the simulated distribution are determined.
7. The probability of a given exchange rate based on Z transformation is estimated with reference to normal distribution tables

The results under this method are shown below:

Expected Exchange Rate	Probability
44	98.35%
45	93.26%
46	80.48%
47	58.79%
48	33.93%
49	14.66%

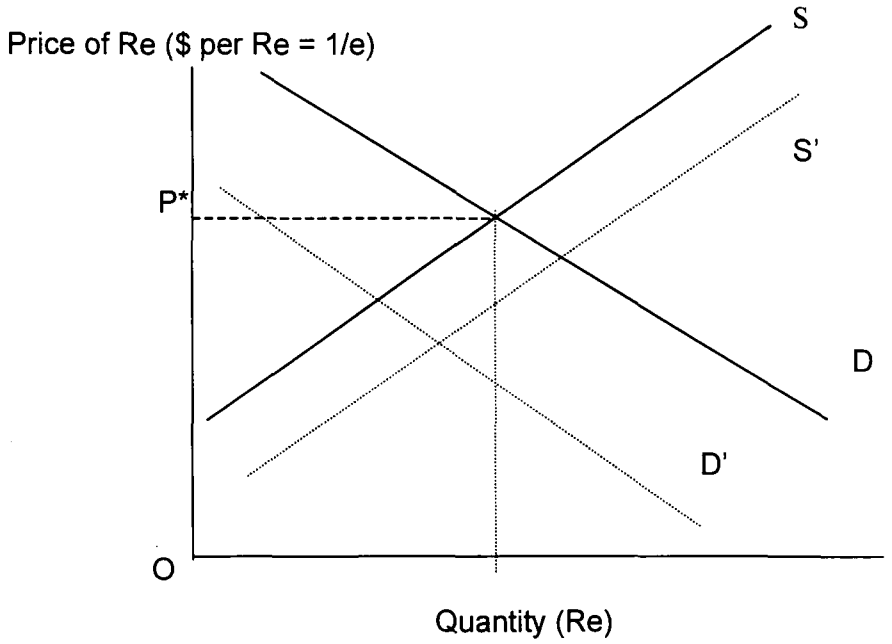
The above two simulation results show that the exchange rate of the Rupee against the Dollar is volatile and the rate is most likely to be in the range of 44 to 47 for the coming year ending March 2005. This calls for forecasting exchange rates, which will be discussed now, in this chapter.

5.3 The Exchange Rate Determination

The exchange rate is determined by supply and demand in the foreign exchange market. Indian companies wishing to import goods will sell the Rupee to buy foreign currencies with which to pay suppliers abroad; tourists visiting India sell their own currencies to buy the Rupee; if an American company intends to buy a bond issued by the Government of India or to buy a factory in Gujarat, it will convert the Dollar into the Rupee. An Indian bank wishing to make a Dollar deposit in New York will sell the Rupee to buy the Dollar. Thus demand for foreign exchange arises as a result of import of goods and services and outflow of capital – purchase of plants and equipment overseas or acquisition of overseas bonds and securities by domestic asset holders. Supply is created by exports of goods and services and inflow of capital. In other words, each debit item in BoP represents a demand for foreign currency and each credit item a supply.

Other things remaining unchanged, the demand for the Rupee increases when the exchange rate rises (the price of the Rupee falls) as the price of Indian goods to consumers abroad falls in their own currencies, increasing the demand for India's exports. The supply of the Rupee, on the other hand, normally goes down as the price of the Rupee falls because foreign goods become more expensive in Rupees in our own market, thereby reducing our import demand. Thus demand and supply curves for the Rupee have their normal shape when plotted against the price of the Rupee (inverse of the exchange rate). The determination of the exchange rate (the price of the Rupee) is shown in the Chart – 5.1.

Chart – 5.1: Exchange Rate Determination



A deficit in the balance of trade (BoT) (imports exceeding exports) implies that supply of the Rupee will exceed demand and the price of the Rupee will tend to fall to reach its equilibrium level. This will be allowed to happen in a floating exchange regime, but in a fixed or managed system the overvalued rate can be supported only by buying up the excess Rupee in exchange for foreign exchange. The reverse is true when the trade balance is in surplus.

Although the price level of the country does not appear explicitly in the figure, it can be used to analyse the effect of price changes. Suppose P rises relative to P*, this will induce a general substitution in favour of foreign goods and away from home goods. The induced rise in import demand will shift the supply curve to the right and the equilibrium price of the Rupee will fall, as predicted by purchasing power parity.

Demand and supply curves can shift for a number of reasons. A change in taste and preference for foreign goods will cause a rightward shift in supply; a leftward shift in demand might be due to a fall in the rate of interest in India as investors switch their funds out of the Indian

money market. In either case the equilibrium price of the Rupee will fall implying depreciation. This would be the outcome under a flexible or floating exchange system. If the authorities wish to keep the exchange rate at the old level they will have to buy Rupee. In a fixed exchange regime (also called a pegged exchange system) the price of the Rupee is not allowed to respond to changes in demand or supply. The authorities will have to stand ready to intervene in the market by buying up excess Rupees (selling foreign currency) or selling Rupees when there is excess demand. The limits to intervention will be set, among other things, by the available stock of foreign exchange.

The repercussions of macroeconomic policy on the exchange rate are not hard to analyse in terms of the demand supply diagram. If expansionary action is taken, fiscal or monetary, the level of income will rise and so will import demand. A deficit will emerge in BoP leading to a depreciation of the currency. There will be an additional effect if the rate of interest changes as a result of the expansionary action.

Fiscal expansion is usually accompanied by a rise in interest rates. This will tend to encourage capital inflow, which adds to the demand for the Rupee. This will counter the rise in the supply caused by income-induced rise in imports. The final effect on the exchange rate will depend on the strength of the marginal propensity to import in relation to the elasticity of capital flows. For a monetary expansion, income rises but interest rate falls. Supply of the Rupee goes up on both counts and the Rupee's price falls unambiguously.

The demand and supply curves for the Rupee (and, therefore, the value of the Rupee) in Chart –5.1 respond not only to domestic policies but to macro policies of our trading partners as well. Suppose, the USA raises its rate of interest as part of a contractionary monetary policy, US bonds become more attractive to Indian investors and, as a result, capital flows out, causing a downward pressure on the Rupee

(upward pressure on the Dollar). Raising the interest rate in India can relieve this pressure, but the result may be an economic recession with declining employment. If, instead, the USA had stimulated domestic spending by tax cuts or expansion in money supply, its imports from India would have gone up, exerting an upward pressure on the Rupee.

This inter-linkage of domestic policies and national exchange rates has given rise to what has aptly been termed an unstable triumvirate: pegged or managed exchange rates, autonomous macro policies and extensive capital flows (Ila Patnaik, 2003; Bimal Jalan, 2003)

Under a freely floating or fully flexible exchange rate the price of a country's currency may be subject to wide and very frequent fluctuations. This is likely to prove very disruptive for business activities by exposing companies to serious currency risks. Moreover, since future expectations are heavily influenced by the volatility of currency prices, the risk of the market becoming disorderly and unstable becomes unbearably high. A fixed exchange rate regime, in contrast guarantees that trade can proceed at a given parity against one or more other major currencies. This guarantee comes from the Central Bank that uses open market interventions to keep the rate constant (or within a narrow band) by purchasing a home currency if it is falling, or selling it if it is rising (Sikdar, 2003).

Today's capital markets are characterized by huge speculative and hedging flows over which national governments have very little control. As a consequence currency values are extremely volatile and difficult to maintain. The days are all but gone when national authorities could stabilize currencies through regulations and limits on interest rates. Advances in information technology and data processing have transformed global operations to the point where US $1.5 trillion is transferred every day around the world. This is many times the annual value of world trade in goods. The tremendous acceleration in speculation encouraged by wide-ranging financial deregulation and

aided by the revolution in communications technology has inevitably precipitated several crises within the past few years. The Mexican crises in 1995 and the South East Asian crises in 1997 are two striking examples.

In the light of their recent volatility, corporates need to forecast the exchange rates using statistical models. For this purpose, the exchange rate (the dependent variable) and the identified nine other macroeconomic variables (independent variables) for the years 1991-2004 are used. These variables have been identified based on the literature review done by us and also based on the recommendations of the Tarapore Committee on Capital Account Convertibility.

5.4 Data Source

The study has used secondary data from the handbook of statistics on the Indian economy, Reserve Bank of India, annual report of the Reserve Bank of India, the website of Reserve Bank of India viz. www.rbi.org.in, Center for Monitoring Indian Economy and the federal reserve statistical release of the US government are used for the study. The secondary data are very reliable and sound.

5.5 The macroeconomic variables selected for data analysis are: -

(1) Exchange Rate
(2) Bank Rate
(3) Balance of Payments
(4) External Debt
(5) Foreign Direct Investment and Foreign Institutional Investment in India
(6) Foreign Exchange Reserves
(7) Gross Domestic Product
(8) Fiscal Deficit
(9) Inflation
(10) US Federal Interest Rate

5.6 Tools of Analysis

The objective of the analysis is to study the relationship between exchange rate of the Rupee against the Dollar and the other nine-macroeconomic variables. This association between the two can be studied either by finding the relationship between the Rupee exchange rate against the Dollar and a macroeconomic variable each at a time, or by analyzing the relationship between the Rupee exchange rate against the Dollar and all the macroeconomic variables jointly at the same time. For this, the univariate relationship is first tested and then the multivariate analysis is carried out. The results of the various models, both univariate and multivariate are given below for a meaningful appreciation of the problem:

References

Bimal Jalan, (2003) Exchange Rate Management: An Emerging Consensus? 14th National Assembly of Forex Association of India in Mumbai

Ila Patnaik (October 2003) The Consequences of Currency Intervention in India: Working Paper No.114. Indian Council for Research on International Economic Relations, New Delhi

Soumyen Sikdar (2003) Contemporary issues in Globalization – Oxford University Press

Results of Univariate Analysis

Table 5.2(a) Hypothesis 1 : Bank rate and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	Bank rate *%*
31.03.1991	19.61	12.00
31.03.1992	29.10	12.00
31.03.1993	31.50	12.00
31.03.1994	31.37	12.00
31.03.1995	31.43	12.00
31.03.1996	34.35	12.00
31.03.1997	35.88	11.00
31.03.1998	39.53	9.00
31.03.1999	42.50	8.00
31.03.2000	43.65	7.00
31.03.2001	46.85	6.50
31.03.2002	48.83	6.25
31.03.2003	47.53	6.00
31.03.2004	43.40	6.00

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0 : There is no relationship between the Bank rate and the exchange rate of the Rupee against the Dollar

H_1 : There is a relationship between the Bank rate and the exchange rate of the Rupee against the Dollar

Chart 5.2(b) Exchange Rate and Bank Rate

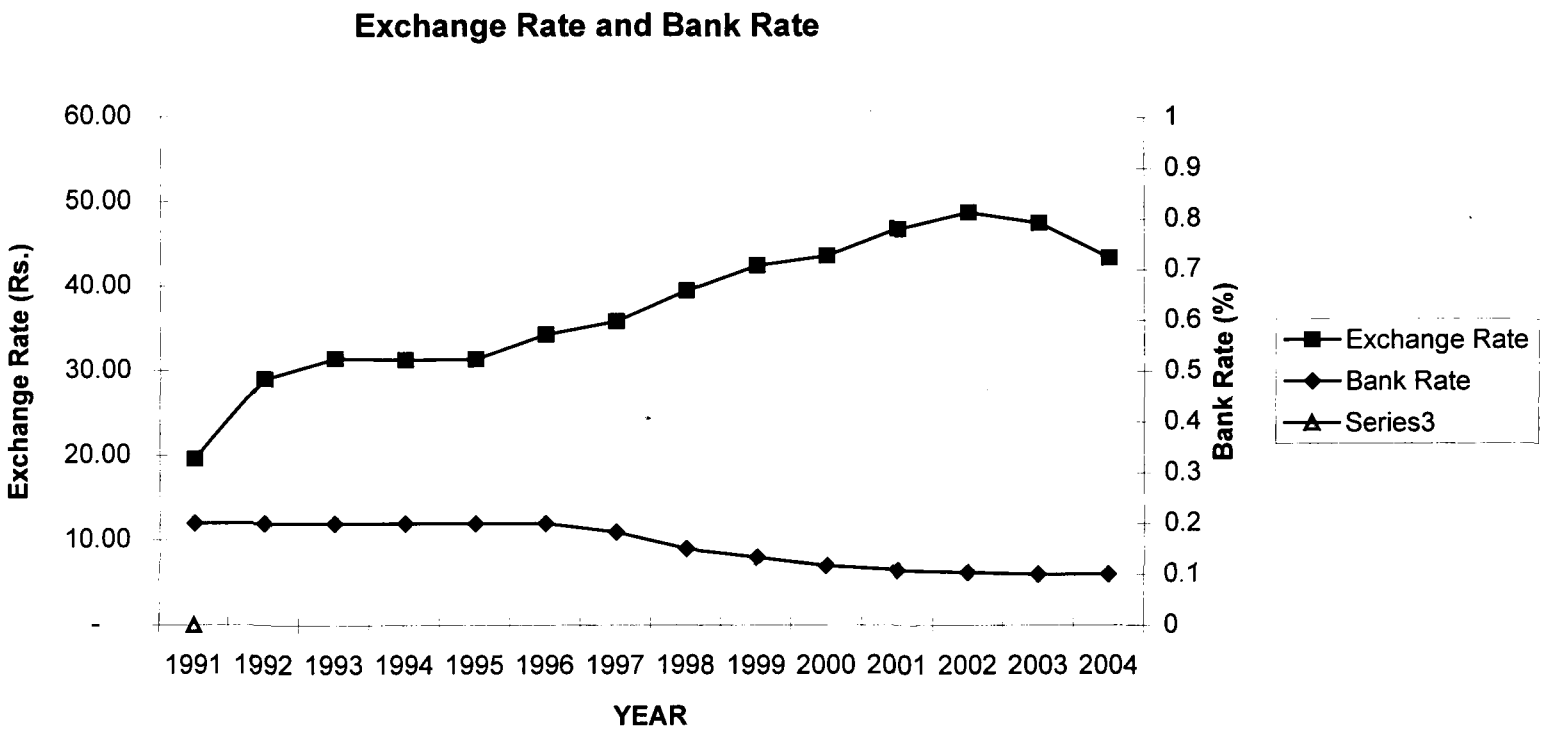


Table 5.2(c) Summary Output of Bank Rates and Exchange Rates

Regression Statistics	
Multiple R	0.906330981
R Square	0.821435847
Adjusted R Square	0.806555501
Standard Error	3.723454609
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	765.337065	765.337065	55.202738	7.948E-06
Residual	12	166.3693707	13.86411422		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	64.61441209	3.77771806	17.10408534	8.58845E-10	56.38347166	72.84535253	56.38347166	72.84535253
X Variable 1	-2.87720508	0.387249182	-7.429854507	7.948E-06	-3.720948551	-2.033461608	-3.720948551	-2.033461608

5.7 Exchange Rate as a function of bank rate.

The least square regression connecting exchange rate, which is a dependent variable to Bank rate, which is the independent variable, throws up the following interesting facets. The co-efficient of determination (r^2) is 0.8214. This implies that 82.14% of the variations in the foreign exchange rate are captured by the bank rate and about 17.86% of the remaining variation will have to be explained by other factors. Even adjusted r^2 is not far away from the original r^2 value and has registered a figure of 80.65%. Thus it points to the fact that the assumption of linear relationship between exchange rate and bank rate appears to be robust. The null hypothesis that there is no linear relationship between the foreign exchange rate and the bank rate is rejected at 5% level of significance by the ANOVA test vide output given above. Thus, it is concluded that there is a very strong relationship between these two variables. It is also interesting to note that the correlation co-efficient between the foreign exchange rate and the bank rate is negative and is of a very high order (90.63%). It also implies that, the greater the bank rate, the smaller the exchange rate or in another words, if the bank rate increases, the exchange rate will decrease.

Results of Univariate Analysis

Table 5.3(a) Hypothesis 2 : Balance of Payments and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate (Rs.)	BoP (Rs. in Crores)
31.03.1991	19.61	(4,471.00)
31.03.1992	29.10	7,274.00
31.03.1993	31.50	(882.00)
31.03.1994	31.37	26,779.00
31.03.1995	31.43	18,160.00
31.03.1996	34.35	(4,049.00)
31.03.1997	35.88	24,220.00
31.03.1998	39.53	16,653.00
31.03.1999	42.50	18,245.00
31.03.2000	43.65	27,770.00
31.03.2001	46.85	27,662.00
31.03.2002	48.83	56,592.00
31.03.2003	47.53	82,016.00
31.03.2004	43.40	143,925.00

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0 : There is no relationship between the Balance of Payments and the exchange rate of the Rupee against the Dollar

H_1 : There is a relationship between the Balance of Payments and the exchange rate of the Rupee against the Dollar

Chart 5.3(b) Exchange Rate and BoP

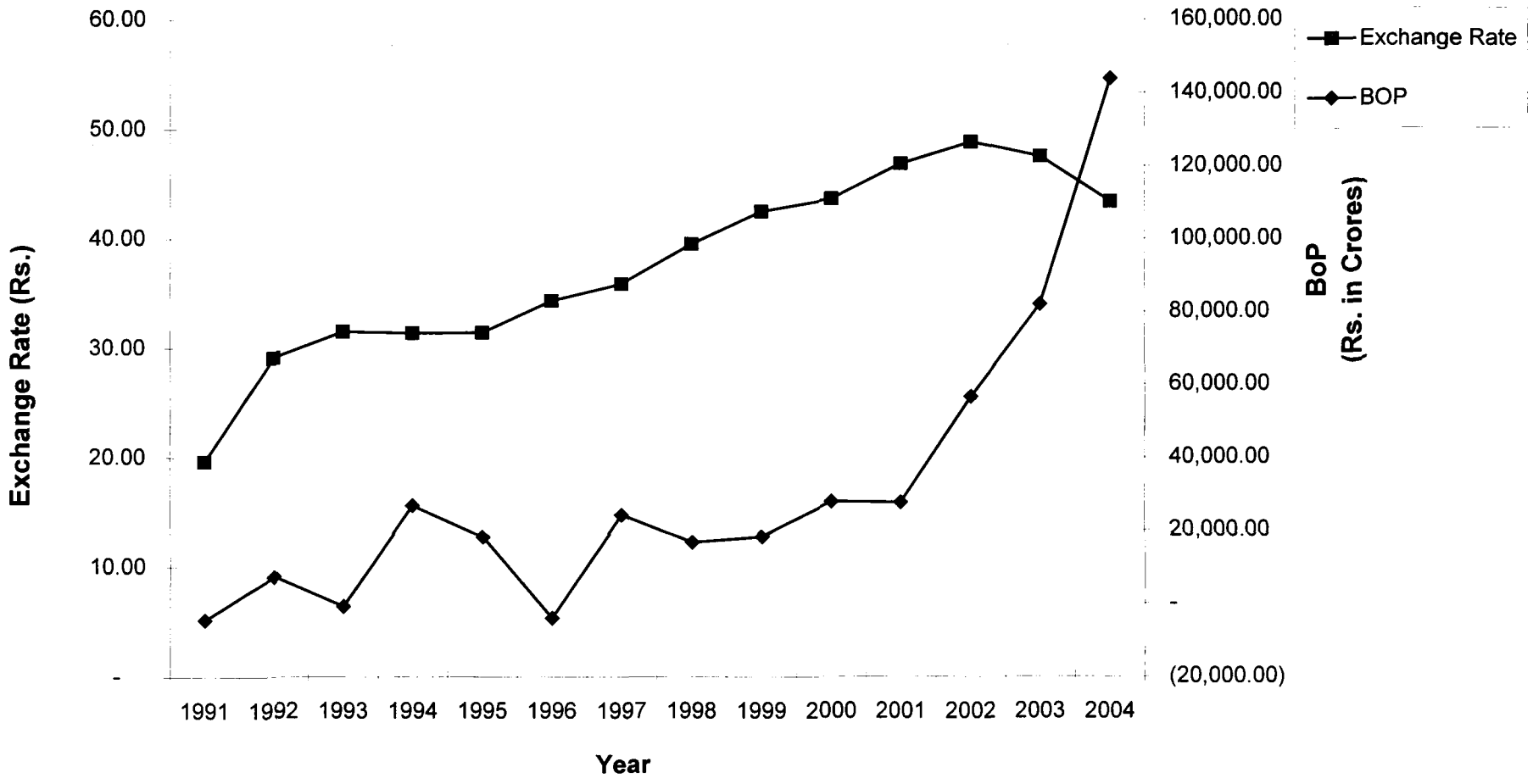


Table 5.3(c) Summary Output of BoP and Exchange Rates

Regression Statistics	
Multiple R	0.5862481
R Square	0.343686835
Adjusted R Square	0.288994072
Standard Error	7.138459214
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	320.2152363	320.2152363	6.283954437	0.027570185
Residual	12	611.4911994	50.95759995		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	33.62908263	2.463976996	13.64829407	1.13856E-08	28.26053803	38.99762723	28.26053803	38.99762723
X Variable 1	0.0001244	4.96254E-05	2.506781689	0.027570185	1.62756E-05	0.000232525	1.62756E-05	0.000232525

5.8 Exchange rate as a function of Balance of Payments (BoP)

When exchange rate is studied as a linear function of BoP; it is inferred that there is a positive correlation between these two variables to the extent of 58.62%. The co-efficient of determination (r^2) is 34.37% and adjusted r^2 is about 28.90%. In a way this tells us that only about 29% of the variations or changes in the foreign exchange rate is explained by BoP and there remains another 71%, which will have to be explained by other factors. Prima facie, this also appears to be affecting the foreign exchange rate with less intensity when compared to bank rate. However, the null hypothesis that there is no linear relationship between these two variables is rejected with 5% level of significance by ANOVA test based on "f" statistics. That means there has been a linear relationship between exchange rate and BoP. If the slope of the BoP is looked in the regression output, it is easy to note that the co-efficient is just 0.0001. Hence, it is concluded that BoP is affecting the exchange rate with lesser intensity when compared to bank rate.

Results of Univariate Analysis

Table 5.4(a) Hypothesis 3 : External Debt and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	Extdebt *(Rs. in Crores)*
31.03.1991	19.61	**163,001.00**
31.03.1992	29.10	**252,910.00**
31.03.1993	31.50	**280,746.00**
31.03.1994	31.37	**290,418.00**
31.03.1995	31.43	**311,685.00**
31.03.1996	34.35	**320,728.00**
31.03.1997	35.88	**335,827.00**
31.03.1998	39.53	**369,682.00**
31.03.1999	42.50	**411,297.00**
31.03.2000	43.65	**428,550.00**
31.03.2001	46.85	**471,724.00**
31.03.2002	48.83	**480,583.00**
31.03.2003	47.53	**496,668.00**
31.03.2004	43.40	**489,168.00**

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0 : There is no relationship between the External debt and the exchange rate of the Rupee against the Dollar

H_1 : There is a relationship between the External debt and the exchange rate of the Rupee against the Dollar

Chart 5.4(b) Exchange Rate Vs. External Debt

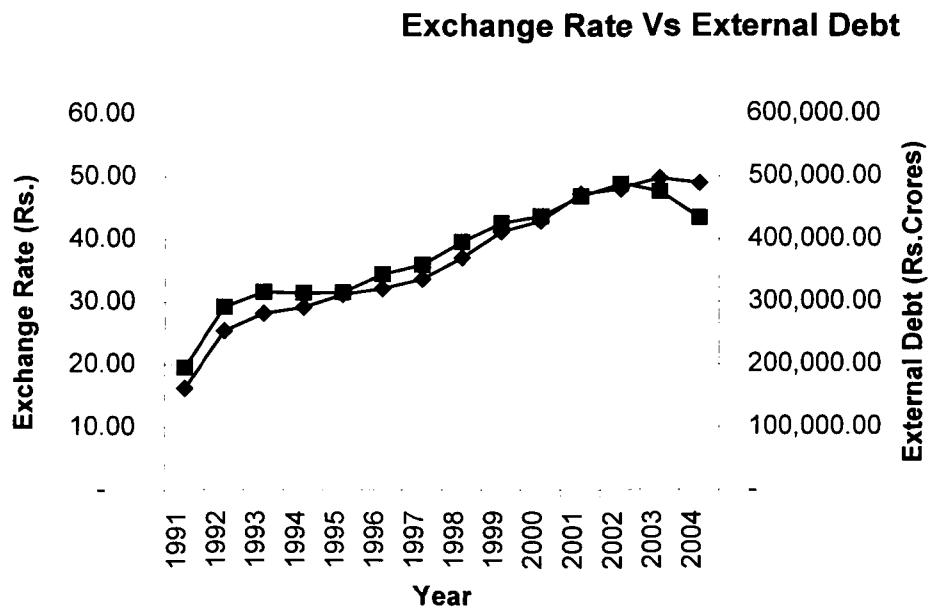


Table 5.4(c) Summary Output of External Debt and Exchange Rates

Regression Statistics	
Multiple R	0.981290773
R Square	0.962931581
Adjusted R Square	0.959842546
Standard Error	1.696488647
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	897.1695509	897.1695509	311.7257009	5.94773E-10
Residual	12	34.53688477	2.878073731		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	7.865918939	1.740669783	4.518903594	0.000703143	4.073325348	11.65851253	4.073325348	11.65851253
X Variable 1	8.14047E-05	4.61066E-06	17.65575546	5.94773E-10	7.13589E-05	9.14505E-05	7.13589E-05	9.14505E-05

5.9 Exchange rate as a function of external debt.

Both r^2 value (96.29%) and the adjusted r^2 value (95.98%), overwhelmingly point to the fact that there is an extremely strong linear relationship between these two variables. This has been however substantiated by the ANOVA test, which shows a very high significant "f" value and the null hypothesis that there is no relationship between exchange rate and external debt is rejected at 5% level. The relationship between the exchange rate and external debt is found to be of a very high order. The slope of the regression line corresponding to the external debt is positive and the correlation between these two variables is very high at 98.13%.

Results of Univariate Analysis

Table 5.5(a) Hypothesis 4 : FDI & FII and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	FDI & FII *(Rs. in Crores)*
31.03.1991	19.61	185.00
31.03.1992	29.10	326.00
31.03.1993	31.50	1,713.00
31.03.1994	31.37	13,026.00
31.03.1995	31.43	16,133.00
31.03.1996	34.35	16,364.00
31.03.1997	35.88	21,773.00
31.03.1998	39.53	19,916.00
31.03.1999	42.50	10,101.00
31.03.2000	43.65	22,450.00
31.03.2001	46.85	23,295.00
31.03.2002	48.83	28,258.00
31.03.2003	47.53	26,802.17
31.03.2004	43.40	66,299.00

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0 : There is no relationship between the FDI&FII and the exchange rate of the Rupee against the Dollar

H_1 : There is a relationship between the FDI&FII and the exchange rate of the Rupee against the Dollar

Chart 5.5(b) Exchange Rate Vs. FDI and FII

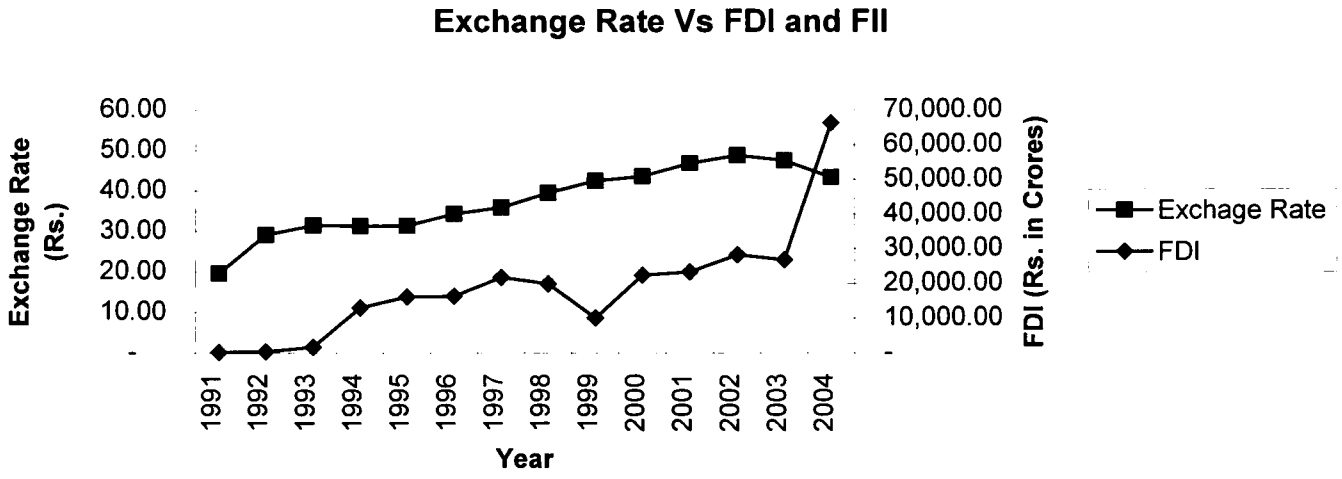


Table 5.5(c) Summary Output of FDI & FII and Exchange Rates

Regression Statistics	
Multiple R	0.624230875
R Square	0.389664185
Adjusted R Square	0.338802868
Standard Error	6.883880969
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	363.0526293	363.0526293	7.661307289	0.017027835
Residual	12	568.6538064	47.3878172		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	31.45075547	2.867263459	10.96891022	1.30708E-07	25.20352516	37.69798577	25.20352516	37.69798577
X Variable 1	0.000319603	0.000115468	2.767906662	0.017027835	6.80212E-05	0.000571186	6.80212E-05	0.000571186

5.10 Exchange rate as a linear function of Foreign Direct Investment (FDI) and Foreign Institutional Investment (FII).

There is positive correlation between these two variables namely, exchange rate, FDI and FII and it is 62.42%. The r^2 value (38.97%) and the adjusted r^2 value (33.88%) show that there has been a fairly strong relationship in the sense of the linear correlation that exists between these two variables. It also implies that 34% of the changes in the foreign exchange rate is captured by FDI and FII and the remaining 66% of the changes in the foreign exchange rate should be accounted for. As before, the ANOVA test at 5% level of significance rejects the null hypothesis of no relationship between these two variables and therefore the alternative hypothesis that there is a strong relationship between these two variables is accepted.

Results of Univariate Analysis

Table 5.6(a) Hypothesis 5 : Foreign Exchange Reserves and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	Fx reserves ***(Rs. in Crores)***
31.03.1991	19.61	**11,416.00**
31.03.1992	29.10	**23,850.00**
31.03.1993	31.50	**30,744.00**
31.03.1994	31.37	**60,420.00**
31.03.1995	31.43	**79,780.00**
31.03.1996	34.35	**74,384.00**
31.03.1997	35.88	**94,932.00**
31.03.1998	39.53	**115,905.00**
31.03.1999	42.50	**138,005.00**
31.03.2000	43.65	**165,913.00**
31.03.2001	46.85	**197,204.00**
31.03.2002	48.83	**264,036.00**
31.03.2003	47.53	**358,280.00**
31.03.2004	43.40	**490,129.00**

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0 : There is no relationship between the Foreign Exchange Reserves and the exchange rate of the Rupee against the Dollar

H_1 : There is a relationship between the Foreign Exchange Reserves and the exchange rate of the Rupee against the Dollar

Chart 5.6(b) Exchange Rate Vs. Foreign Exchange Reserves

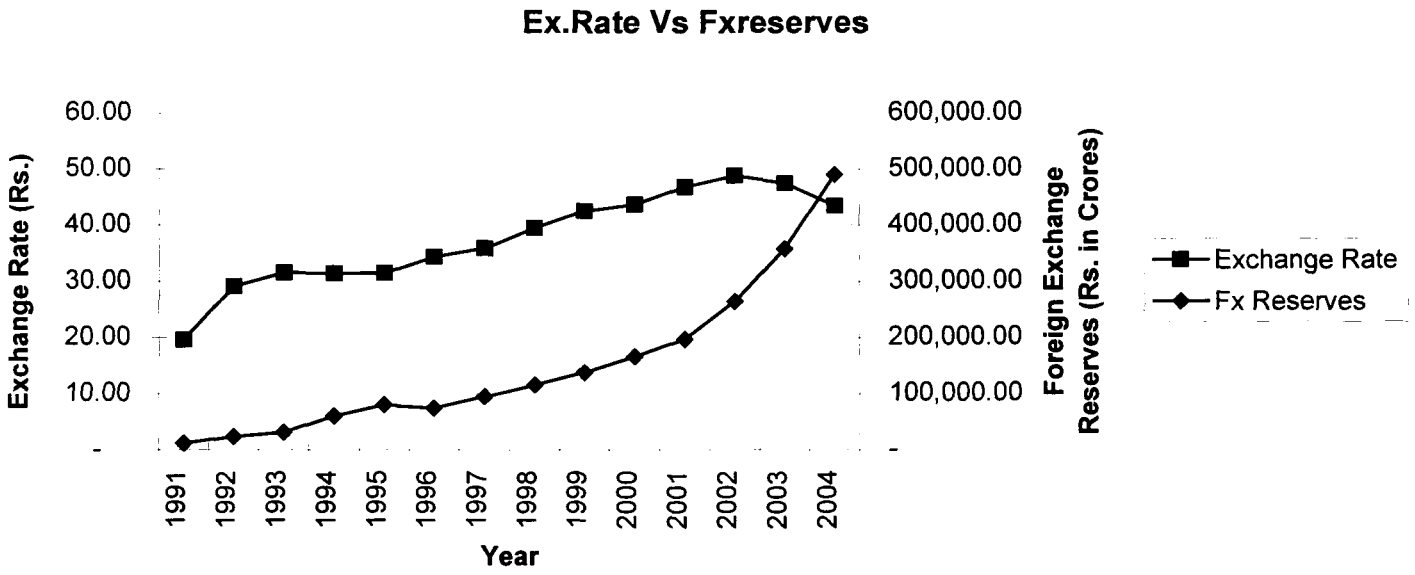


Table 5.6(c) Summary Output of Forex Reserves and Exchange Rates

Regression Statistics	
Multiple R	0.748649686
R Square	0.560476352
Adjusted R Square	0.523849381
Standard Error	5.841710734
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	522.1994241	522.1994241	15.30228521	0.002065464
Residual	12	409.5070117	34.1255843		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	30.62310801	2.358422589	12.98457204	1.99918E-08	25.4845467	35.76166932	25.4845467	35.76166932
X Variable 1	4.59889E-05	1.17564E-05	3.911813545	0.002065464	2.03739E-05	7.16039E-05	2.03739E-05	7.16039E-05

5.11 Exchange rate as a function of Foreign Exchange Reserves (FXRES).

The figures of interest are positive correlation co-efficient, which is 74.86%, r^2 value, which is 56.05%, and adjusted r^2 value, which is 52.38%. All these figures prima facie point that the relationship between exchange rate and Foreign Exchange Reserves is quite strong in the linear sense. It is further validated by the statistical ANOVA test that rejects the null hypothesis that no linear relationship exists between these two variables at 5% level of significance. All factors considered, it is reasonable to infer that there is a strong relationship between exchange rate when regressed on Foreign Exchange Reserves.

Results of Univariate Analysis

Table 5.7(a) Hypothesis 6 : Gross Domestic Product and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	GDP ***(Rs. in Crores)***
31.03.1991	19.61	**510,954.00**
31.03.1992	29.10	**589,086.00**
31.03.1993	31.50	**673,221.00**
31.03.1994	31.37	**781,345.00**
31.03.1995	31.43	**917,058.00**
31.03.1996	34.35	**1,073,271.00**
31.03.1997	35.88	**1,243,546.00**
31.03.1998	39.53	**1,390,148.00**
31.03.1999	42.50	**1,598,127.00**
31.03.2000	43.65	**1,761,932.00**
31.03.2001	46.85	**1,917,724.00**
31.03.2002	48.83	**2,094,013.00**
31.03.2003	47.53	**2,249,500.00**
31.03.2004	43.40	**2,433,959.00**

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0: There is no relationship between the Gross Domestic Product and the exchange rate of the Rupee against the Dollar

H_1: There is a relationship between the Gross Domestic Product and the exchange rate of the Rupee against the Dollar

Chart 5.7(b) Exchange Rate and GDP

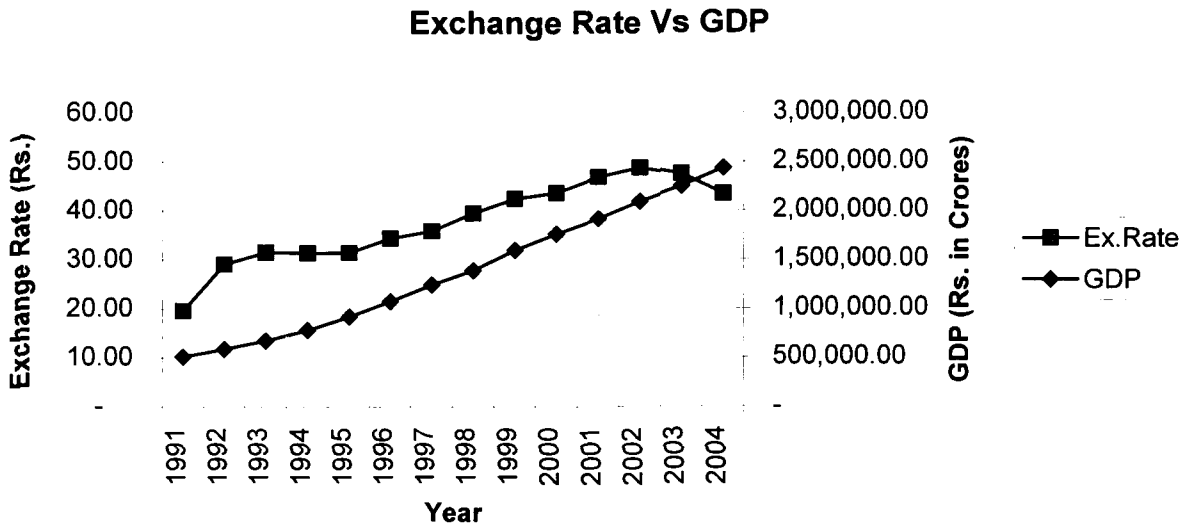


Table 5.7(c) Summary Output of GDP and Exchange Rates

Regression Statistics	
Multiple R	0.923011152
R Square	0.851949586
Adjusted R Square	0.839612052
Standard Error	3.390421842
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	793.7669125	793.7669125	69.05347163	2.54278E-06
Residual	12	137.9395232	11.49496026		
Total	13	931.7064357			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	20.91894361	2.19560877	9.52762801	6.02554E-07	16.13512314	25.70276409	16.13512314	25.70276409
X Variable 1	1.20966E-05	1.4557E-06	8.309841854	2.54278E-06	8.92492E-06	1.52683E-05	8.92492E-06	1.52683E-05

5.12 Exchange rate as a linear function of GDP.

Even a cursory glance at the results produced by the computer output will reveal that there is a very strong linear relationship between exchange rate and the GDP. This can be substantiated by looking at the correlation co-efficient, which is positive at 92.30%, the r^2 value (85.19%) and the adjusted r^2 value (83.96%). The null hypothesis, that there is no linear relationship between these two variables is overwhelmingly rejected by the ANOVA test that shows highly significant relationship.

Results of Univariate Analysis

Table 5.8(a) Hypothesis 7 : Fiscal Deficit and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate (Rs.)	Fiscal Deficit (Rs. in Crores)
31.03.1991	19.61	**53,580.00**
31.03.1992	29.10	**45,850.00**
31.03.1993	31.50	**52,404.00**
31.03.1994	31.37	**70,952.00**
31.03.1995	31.43	**71,639.00**
31.03.1996	34.35	**77,671.00**
31.03.1997	35.88	**87,244.00**
31.03.1998	39.53	**110,743.00**
31.03.1999	42.50	**157,053.00**
31.03.2000	43.65	**184,826.00**
31.03.2001	46.85	**199,852.00**
31.03.2002	48.83	**237,027.00**
31.03.2003	47.53	**248,314.00**
31.03.2004	43.40	**284,215.00**

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0: There is no relationship between the Fiscal Deficit and the exchange rate of the Rupee against the Dollar

H_1: There is a relationship between the Fiscal Deficit and the exchange rate of the Rupee against the Dollar

Chart 5.8(b) Exchange Rate Vs. Fiscal Deficit

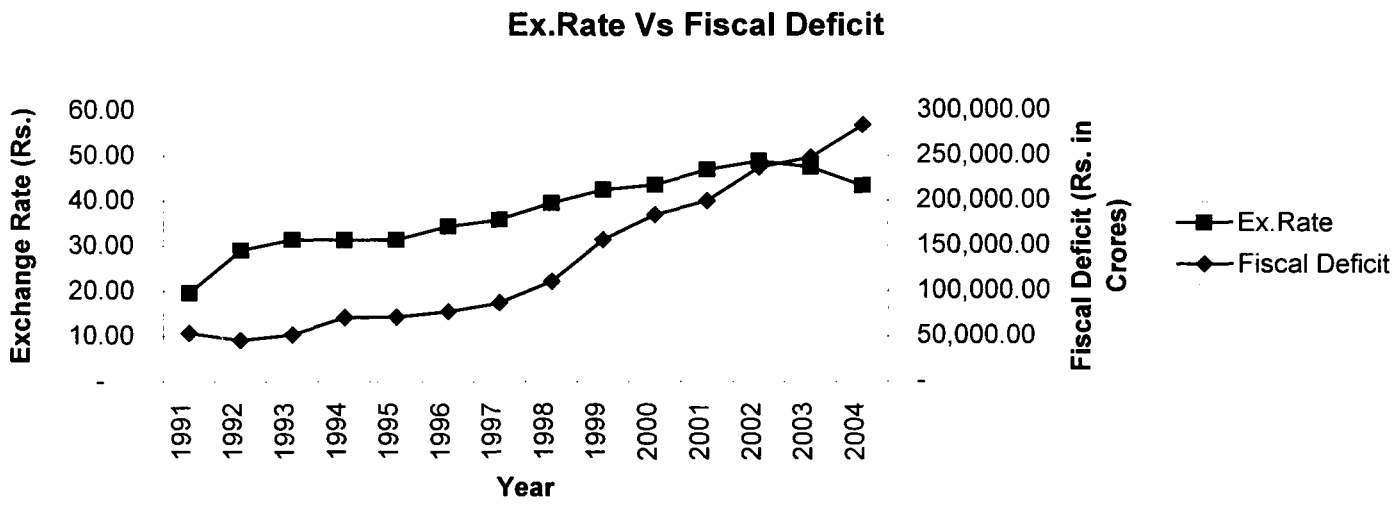


Table 5.8(c) Summary Output of Fiscal Deficit and Exchange Rates

Regression Statistics	
Multiple R	0.868855364
R Square	0.754909644
Adjusted R Square	0.734485447
Standard Error	4.362264917
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	703.3541733	703.3541733	36.96153473	5.50438E-05
Residual	12	228.3522625	19.02935521		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	25.54793803	2.290990783	11.15148006	1.08997E-07	20.556298	30.53957806	20.556298	30.53957806
X Variable 1	8.92216E-05	1.46756E-05	6.079599882	5.50438E-05	5.72463E-05	0.000121197	5.72463E-05	0.000121197

5.13 Exchange rate as a linear function of Gross Fiscal Deficit (GFD).

GFD also appears to be a major variable in influencing the foreign exchange rate in a positive manner significantly. The reason for this inference is based on the correlation co-efficient, which is highly positive at 86.88%, r^2 value of 75.49%, and adjusted r^2 value of 73.44%. All these arguments are further strengthened by the statistical testing of ANOVA that clearly rejects the null hypothesis that no linear relationship exists between these two variables at 5% level. Once again there is a very strong linear relationship when the exchange rate is regressed on GFD.

Results of Univariate Analysis

Table 5.9(a) Hypothesis 8 : Inflation (CPI) and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	Inflation (CPI) *%*
31.03.1991	19.61	11.60
31.03.1992	29.10	13.50
31.03.1993	31.50	9.60
31.03.1994	31.37	7.50
31.03.1995	31.43	10.10
31.03.1996	34.35	10.20
31.03.1997	35.88	9.40
31.03.1998	39.53	6.80
31.03.1999	42.50	13.10
31.03.2000	43.65	3.40
31.03.2001	46.85	3.80
31.03.2002	48.83	4.30
31.03.2003	47.53	4.10
31.03.2004	43.40	5.00

Source : Handbook of statistics on the Indian Economy by the RBI
Annual Report of RBI
Economic intelligence service of CMIE

H_0 : There is no relationship between the Inflation (CPI) and the exchange rate of the Rupee against the Dollar

H_1 : There is a relationship between the Inflation (CPI) and the exchange rate of the Rupee against the Dollar

Chart 5.9(b) Exchange Rate Vs. Inflation CPI

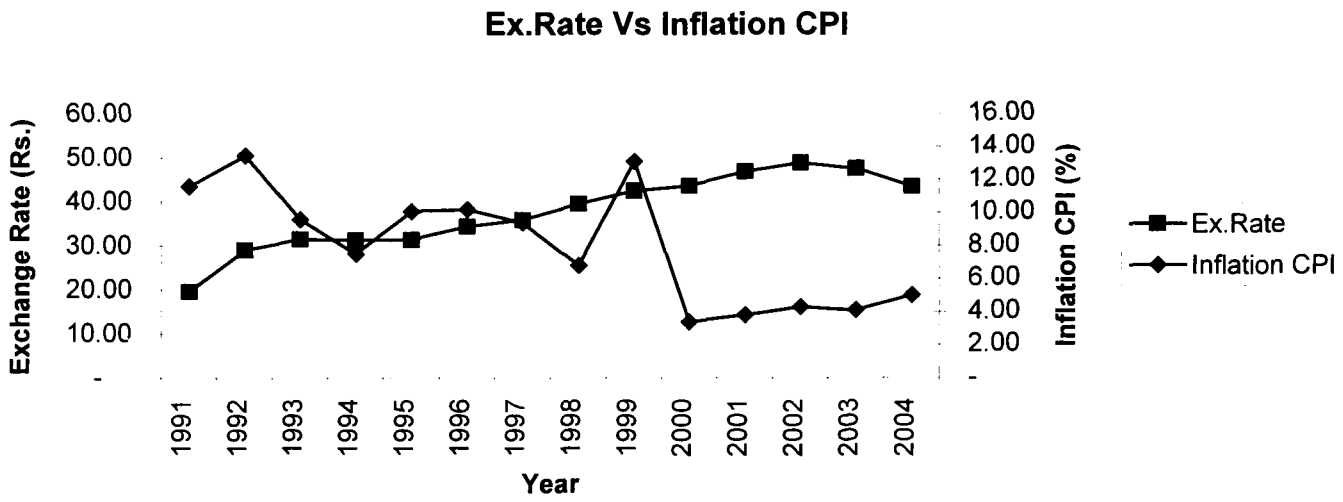


Table 5.9(c) Summary Output of Inflation and Exchange Rates

Regression Statistics	
Multiple R	0.72813656
R Square	0.53018285
Adjusted R Square	0.491031421
Standard Error	6.039672052
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	493.9747737	493.9747737	13.54185178	0.003149258
Residual	12	437.731662	36.4776385		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	51.58477956	4.144439202	12.4467454	3.21478E-08	42.55482241	60.61473672	42.55482241	60.61473672
X Variable 1	-1.749616672	0.475448937	-3.679925512	0.003149258	-2.785530897	-0.713702446	-2.785530897	-0.713702446

5.14 Exchange rate as a linear function of inflation (the Consumer Price Index)

At the outset of the analysis, it should be pointed out that the inflation rate is based on the consumer price index given in the handbook of statistics of Reserve Bank of India. The correlation co-efficient between exchange rate and inflation rate is negative at (-72.81%) and consequently the slope corresponding to inflation is (-1.75%), r^2 value is 53.02% and adjusted r^2 value is 49.10%, which is a matter for concern because about 50.90% of the changes in exchange rate will have to be explained by other variables. However, it is interesting to note that the null hypothesis of no linear relationship between these two variables is statistically rejected at 5% level as evidenced by the ANOVA test. The negative correlation implies that if inflation keeps on increasing, exchange rate will decrease.

Results of Univariate Analysis

Table 5.10(a) Hypothesis 9 : US Federal Interest Rate and Exchange rate of the Rupee against the Dollar

Year	Exc. Rate *(Rs.)*	US Fed Int rates %
31.03.1991	19.61	**6.00**
31.03.1992	29.10	**3.50**
31.03.1993	31.50	**3.00**
31.03.1994	31.37	**3.00**
31.03.1995	31.43	**5.25**
31.03.1996	34.35	**5.00**
31.03.1997	35.88	**5.00**
31.03.1998	39.53	**5.00**
31.03.1999	42.50	**4.50**
31.03.2000	43.65	**5.34**
31.03.2001	46.85	**4.81**
31.03.2002	48.83	**1.25**
31.03.2003	47.53	**1.00**
31.03.2004	43.40	**1.00**

Source : Board of Governors of the Federal Reserve System
Website : www.federalreserve.gov

H_0: There is no relationship between the US federal Interest rate and the exchange rate of the Rupee against the Dollar

H_1: There is a relationship between the US federal Interest rate and the exchange rate of the Rupee against the Dollar

Chart 5.10(b) Exchange Rate Vs. US Federal Interest Rate

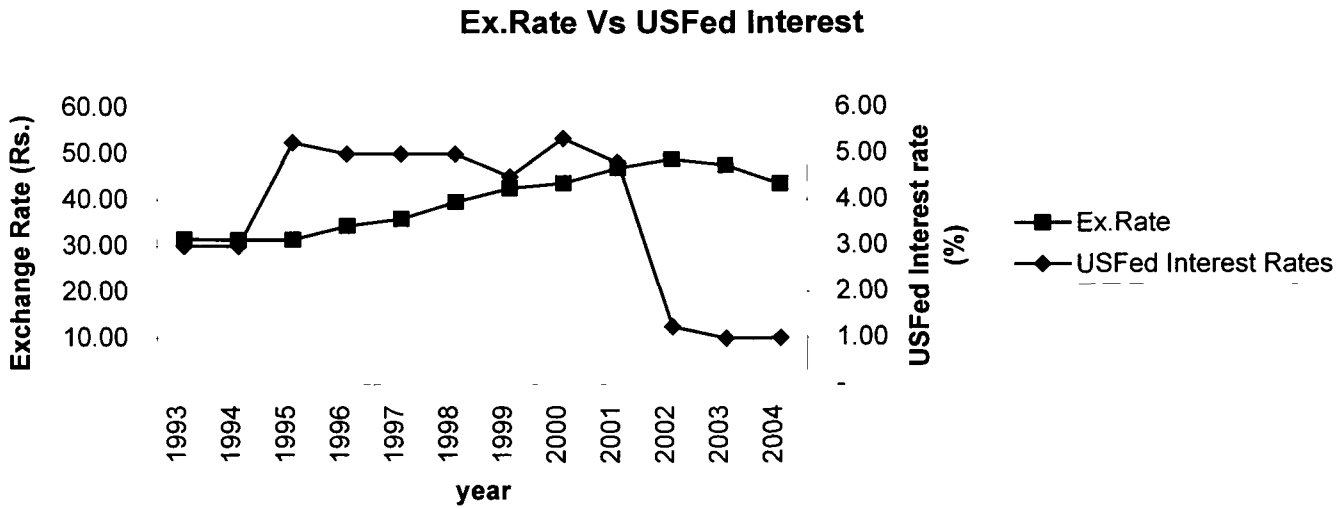


Table 5.10(c) Summary Output of US Federal Interest Rates and Exchange Rates

Regression Statistics	
Multiple R	0.475768826
R Square	0.226355976
Adjusted R Square	0.16188564
Standard Error	7.750317824
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	210.8973192	210.8973192	3.511009743	0.085511327
Residual	12	720.8091165	60.06742637		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	46.48576363	5.205239697	8.930571182	1.19809E-06	35.14452079	57.82700647	35.14452079	57.82700647
X Variable 1	-2.334961619	1.246131083	-1.873768861	0.085511327	-5.050047962	0.380124725	-5.050047962	0.380124725

5.15 Exchange rate as a linear function of US Federal Interest Rates

A careful analysis of the results based on the computer output clearly tells us that US Federal Interest Rates influence the exchange rate only very moderately. The correlation co-efficient that was negative at (-47.58%), r^2 value, a small figure of 22.63% and adjusted r^2 value even smaller at 16.18% clearly signify that individually when the exchange rate is regressed on US Federal Interest Rate, the impact seems to be rather low. The ANOVA test also implies the null hypothesis of no linear relationship between the two variables is accepted at 5% level. However, it is significant at 8.55% level.

CAUTION:

Here, univariate regression is used throughout with the exchange rate as a function of all the nine variables in an individual fashion treating them as simple regression lines. The combined influence of all the independent variables that will impact the exchange rate cannot be fully comprehended by this regression approach. Therefore, this will lead to seeking the help of multiple linear regression analysis in which exchange rate will be postulated as a linear function of these nine variables simultaneously.

5.11 Results of Multivariate Analysis

SUMMARY OUTPUT

Table 5.11 Multivariate Regression based on 9 Macro Economic Variables

Regression Statistics	
Multiple R	0.999833648
R Square	0.999667325
Adjusted R Square	0.998918805
Standard Error	0.278368401
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	9	931.3964798	103.4884978	1335.525584	1.36852E-06
Residual	4	0.309955867	0.077488967		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	21.7848066	3.375974582	6.452894139	0.002969026	12.41157908	31.15803411	12.41157908	31.15803411
Bank Rate	-0.797959204	0.211684114	-3.769575277	**0.019611671**	-1.385689745	-0.210228664	-1.385689745	-0.210228664
BOP	-2.52524E-05	1.39696E-05	-1.807674022	0.144938757	-6.40383E-05	1.35334E-05	-6.40383E-05	1.35334E-05
External Debt	7.01176E-05	4.55584E-06	15.39070798	**0.00010399**	5.74685E-05	8.27666E-05	5.74685E-05	8.27666E-05
FDI & FII	5.41795E-05	2.25373E-05	2.403996841	0.074034785	-8.39409E-06	0.000116753	-8.39409E-06	0.000116753
FX Reserves	-3.26139E-05	5.90392E-06	-5.524107886	**0.005244659**	-4.90059E-05	-1.6222E-05	-4.90059E-05	-1.6222E-05
GDP	8.01714E-06	1.55941E-06	5.141122403	**0.006786007**	3.6875E-06	1.23468E-05	3.6875E-06	1.23468E-05
Gross Fiscal Deficit	-3.68785E-05	9.68102E-06	-3.80936039	**0.01895055**	-6.37574E-05	-9.99962E-06	-6.37574E-05	-9.99962E-06
Inflation (CPI)	0.022989845	0.038426069	0.598287727	0.581877072	-0.083698246	0.129677936	-0.083698246	0.129677936
US Fed Interest Rate	-1.010692177	0.11287672	-8.953947059	**0.00086063**	-1.324088843	-0.69729551	-1.324088843	-0.69729551

5.16 Multiple Linear Regressions using all the nine variables:

It is intriguing to note that the multiple regression analysis does show that there is a very strong linear relationship between the dependent variable (exchange rate) and the nine independent variables (bank rate, BoP, external debt, FDI and FII, FXRES, GDP, GFD, inflation and US federal interest rates). The multiple correlations are 99.98%. Equally amazing is r^2 value of 99.96% followed by a strong adjusted r^2 value of 99.89%. It appears just a matter of formality to conduct the statistical validity test by ANOVA. Incidentally, this also in an overwhelming manner rejects the null hypothesis of no linear relationship between the dependent variable and the set of independent variables already mentioned in the beginning.

If the contribution made by each of the independent variables using the "P" (Probability significance) value is looked at, there are some interesting insights to be observed. The most significant ones amongst the independent variables are (1) External Debt that has a "P" value of 0.0001, (2) US Federal Interest Rate that has a "P" value of 0.0008 (3) GDP that has a "P" value of 0.0067 (4) Foreign Exchange Reserves that has a "P" value of 0.0052. (5) Gross Fiscal Deficit that has a "P" value of 0.0189 and (6) Bank rate that has a "P" value of 0.0196. All these independent variables are highly statistically significant if chosen on a level of significance of 5%. It should be noted that "P" value of each of the variables highlighted is far less than the stipulated level of significance of 5%. The rest of the variables when looked at individually, are not significant at 5% level. What do they tell? It looks like External Debt, US Federal Interest Rate, GDP, Foreign Exchange Reserves, Gross Fiscal Deficit and Bank rate impact the exchange rate far more significantly than the rest of the variables. So the premise that the six significant variables that are of great importance in explaining the exchange rates are given in the order: (1) External Debt (2) US Federal Interest Rates (3) GDP (4) Foreign Exchange Reserves (5) Gross Fiscal Deficit and (6) Bank rate. So the next interesting question: What is wrong if the multiple linear regressions are done using only these six variables? Will the loss of information by not using the other variables be substantial? The results are as follows: -

5.12 Results of Multivariate Analysis

SUMMARY OUTPUT

Table 5.12 Multivariate Regression based on 6 Significant Macro Economic Variables

Regression Statistics	
Multiple R	0.999579062
R Square	0.999158301
Adjusted R Square	0.998436844
Standard Error	0.334710224
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	930.9222192	155.1537032	1384.918411	2.13809E-10
Residual	7	0.784216538	0.112030934		
Total	13	931.7064357			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	17.13396271	3.357158535	5.103709738	0.001393743	9.195549898	25.07237552	9.195549898	25.07237552
Bank Rate	7.06305E-05	5.39455E-06	13.09292958	3.53524E-06	5.78744E-05	8.33865E-05	5.78744E-05	8.33865E-05
External Debt	-3.50841E-05	3.96089E-06	-8.857636691	4.73128E-05	-4.44502E-05	-2.57181E-05	-4.44502E-05	-2.57181E-05
FX Reserves	9.4428E-06	1.68871E-06	5.591735677	0.000823041	5.44965E-06	1.34359E-05	5.44965E-06	1.34359E-05
GDP	-0.842508387	0.108073199	-7.795719873	0.000107478	-1.098060712	-0.586956062	-1.098060712	-0.586956062
Gross Fiscal Deficit	-0.526408353	0.216020754	-2.436841568	0.044966839	-1.037215902	-0.015600805	-1.037215902	-0.015600805
US Fed Interest Rate	-3.61367E-05	1.14297E-05	-3.161654648	0.015891601	-6.31636E-05	-9.10983E-06	-6.31636E-05	-9.10983E-06

5.17 Multiple Linear Regression as a function of six significant variables

The multiple correlations are 99.95%. r^2 value is 99.92% and the adjusted r^2 is 99.84%. The comparative picture between this output using only six variables and the output using all the nine variables reveal that the differences seen are marginal only.

The null hypothesis of no linear relationship between the dependent variable and the independent variables is rejected at 5% level. The "f" value is highly significant as evidenced by the ANOVA test. The forecast exchange rate based on all the nine variables and also based on the six significant variables is given below: -

The forecasted exchange rate for March 2005 based on all the nine variables comes to 44.55.

The forecasted exchange rate for March 2005 based on the six significant variables comes to 45.91. So it appears that the contribution made by the remaining three variables namely, balance of payments, FDI and FII investments and inflation (CPI) do improve the values of forecasted exchange rates only marginally.

Table 5.13 Forecasting Exchanging Rates based on all the nine variables

Year	Exc. Rate (Rs.)	Bank rate %	BoP (Rs. in Crores)	Extdebt (Rs. in Crores)	FDI & FII (Rs. in Crores)	Fx reserves (Rs. in Crores)	GDP (Rs. in Crores)	Fiscal Deficit (Rs. in Crores)	Inflation (CPI) %	US Fed Int rates %
31.03.1991	19.61	12.00	(4,471.00)	163,001.00	185.00	11,416.00	510,954.00	53,580.00	11.60	6.00
31.03.1992	29.10	12.00	7,274.00	252,910.00	326.00	23,850.00	589,086.00	45,850.00	13.50	3.50
31.03.1993	31.50	12.00	(882.00)	280,746.00	1,713.00	30,744.00	673,221.00	52,404.00	9.60	3.00
31.03.1994	31.37	12.00	26,779.00	290,418.00	13,026.00	60,420.00	781,345.00	70,952.00	7.50	3.00
31.03.1995	31.43	12.00	18,160.00	311,685.00	16,133.00	79,780.00	917,058.00	71,639.00	10.10	5.25
31.03.1996	34.35	12.00	(4,049.00)	320,728.00	16,364.00	74,384.00	1,073,271.00	77,671.00	10.20	5.00
31.03.1997	35.88	11.00	24,220.00	335,827.00	21,773.00	94,932.00	1,243,546.00	87,244.00	9.40	5.00
31.03.1998	39.53	9.00	16,653.00	369,682.00	19,916.00	115,905.00	1,390,148.00	110,743.00	6.80	5.00
31.03.1999	42.50	8.00	18,245.00	411,297.00	10,101.00	138,005.00	1,598,127.00	157,053.00	13.10	4.50
31.03.2000	43.65	7.00	27,770.00	428,550.00	22,450.00	165,913.00	1,761,932.00	184,826.00	3.40	5.34
31.03.2001	46.85	6.50	27,662.00	471,724.00	23,295.00	197,204.00	1,917,724.00	199,852.00	3.80	4.81
31.03.2002	48.83	6.25	56,592.00	480,583.00	28,258.00	264,036.00	2,094,013.00	237,027.00	4.30	1.25
31.03.2003	47.53	6.00	82,016.00	496,668.00	26,802.17	358,280.00	2,249,500.00	248,314.00	4.10	1.00
31.03.2004	43.40	6.00	143,925.00	489,168.00	66,299.00	490,129.00	2,433,959.00	284,215.00	5.00	1.00
Expected 31.03.2005	**44.55**	**6.00**	**144000.00**	**548817.00**	**44279.00**	**554400.00**	**2579996.00**	**283172.00**	**7.50**	**2.00**

Table 5.14 Forecasting exchange rate based on six significant variables

Year	Exc. Rate (Rs.)	Extdebt (Rs. in Crores)	Fx reserves (Rs. in Crores)	GDP (Rs. in Crores)	US Fed Int rates %	Bank rate %	Fiscal Deficit (Rs. in Crores)
31.03.1991	19.61	163,001.00	11,416.00	510,954.00	6.00	12.00	53,580.00
31.03.1992	29.10	252,910.00	23,850.00	589,086.00	3.50	12.00	45,850.00
31.03.1993	31.50	280,746.00	30,744.00	673,221.00	3.00	12.00	52,404.00
31.03.1994	31.37	290,418.00	60,420.00	781,345.00	3.00	12.00	70,952.00
31.03.1995	31.43	311,685.00	79,780.00	917,058.00	5.25	12.00	71,639.00
31.03.1996	34.35	320,728.00	74,384.00	1,073,271.00	5.00	12.00	77,671.00
31.03.1997	35.88	335,827.00	94,932.00	1,243,546.00	5.00	11.00	87,244.00
31.03.1998	39.53	369,682.00	115,905.00	1,390,148.00	5.00	9.00	110,743.00
31.03.1999	42.50	411,297.00	138,005.00	1,598,127.00	4.50	8.00	157,053.00
31.03.2000	43.65	428,550.00	165,913.00	1,761,932.00	5.34	7.00	184,826.00
31.03.2001	46.85	471,724.00	197,204.00	1,917,724.00	4.81	6.50	199,852.00
31.03.2002	48.83	480,583.00	264,036.00	2,094,013.00	1.25	6.25	237,027.00
31.03.2003	47.53	496,668.00	358,280.00	2,249,500.00	1.00	6.00	248,314.00
31.03.2004	43.40	489,168.00	490,129.00	2,433,959.00	1.00	6.00	284,215.00
Expected 31.03.2005	**45.91**	**548817.00**	**549240.00**	**2579996.00**	**2.00**	**6.00**	**283172.00**

5.18 Time Series Regression Analysis

The forecasting of the exchange rates based on time series regression analysis taking the daily data from January 1973 to November 2004 was made and the rates obtained for the Rupee against the Dollar for the month of December 2004 is 47.14; for January 2005 it is 47.27; and for February 2005, it is 47.39. This method of forecasting is influenced very much by the past data, which showed a linear depreciating trend and hence is not very reliable in the current volatile exchange rate movement.

5.19 Forecasting based on Exponential Smoothing Method

The forecasting of the exchange rates based on exponential smoothing method taking the monthly data and the yearly data from 1973 to 2004 was made. The forecasted exchange rate based on the monthly exponential smoothing is 44.10 and based on the yearly exponential smoothing it is 44.17 for March 2005.

5.20 Forecasting based on the Moving Average Method

The forecasted exchange rate based on the monthly moving average is 44.63 and the yearly moving average is 43.70 for March 2005. Based on the various techniques of forecasting methods used, the likely range for the Rupee against the Dollar from November 2004 to March 2005 is 43.70 to 45.91.

Table 5.15(a) Time series Regression Analysis Forecast for the three months December 2004, January 2005 and February 2005

Time period	1 month	2 months	3 months
Obervations	8024	8045	8065
Expected	47.14	47.27	47.39

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.946685
R Square	0.896212
Adjusted R Squ	0.896199
Standard Error	4.766782
Observations	7978

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1564948	1564947.655	68873.04352	0
Residual	7976	181232.3	22.72220851		
Total	7977	1746180			

	Coefficient	*andard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0*	*pper 95.0%*
Intercept	-1.659309	0.106745	-15.54454762	1.05733E-53	-1.868557433	-1.450059785	-1.868557	-1.45006
X Variable 1	0.006081	2.32E-05	262.4367419	0	0.006035918	0.006126767	0.006036	0.006127

Chart 5.15(b) Time Series Regression Chart forecasting exchange rate (1973-2004)

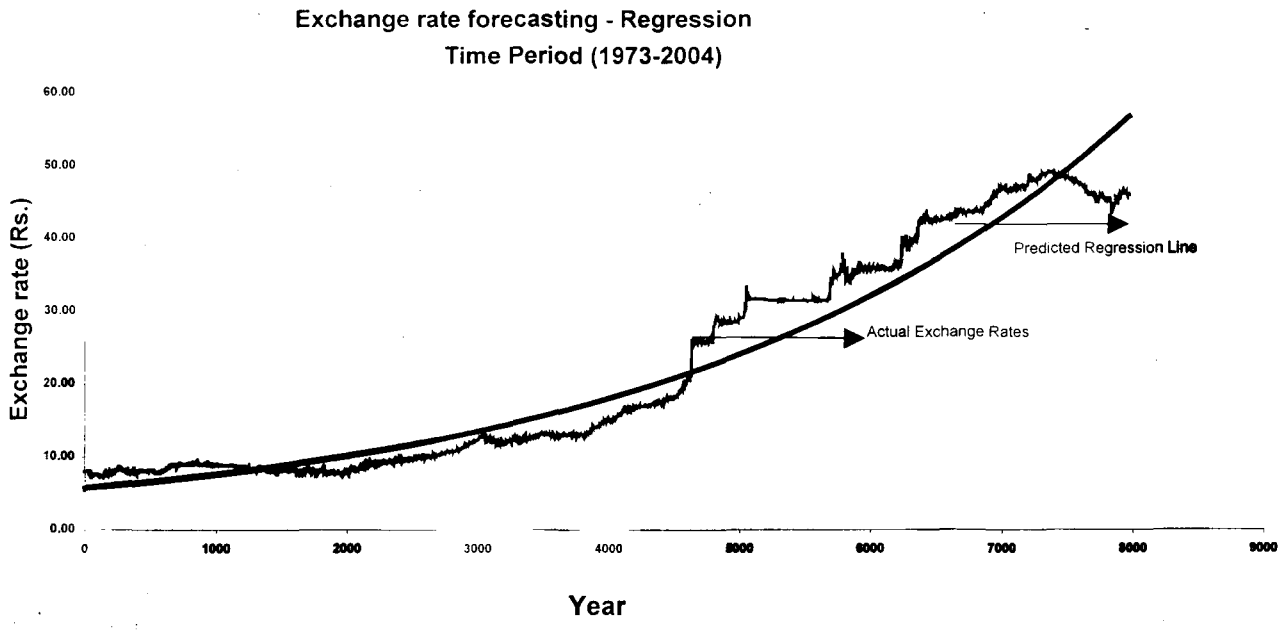


Chart 5.16 Forecasting based on Monthly Exponential Smoothing

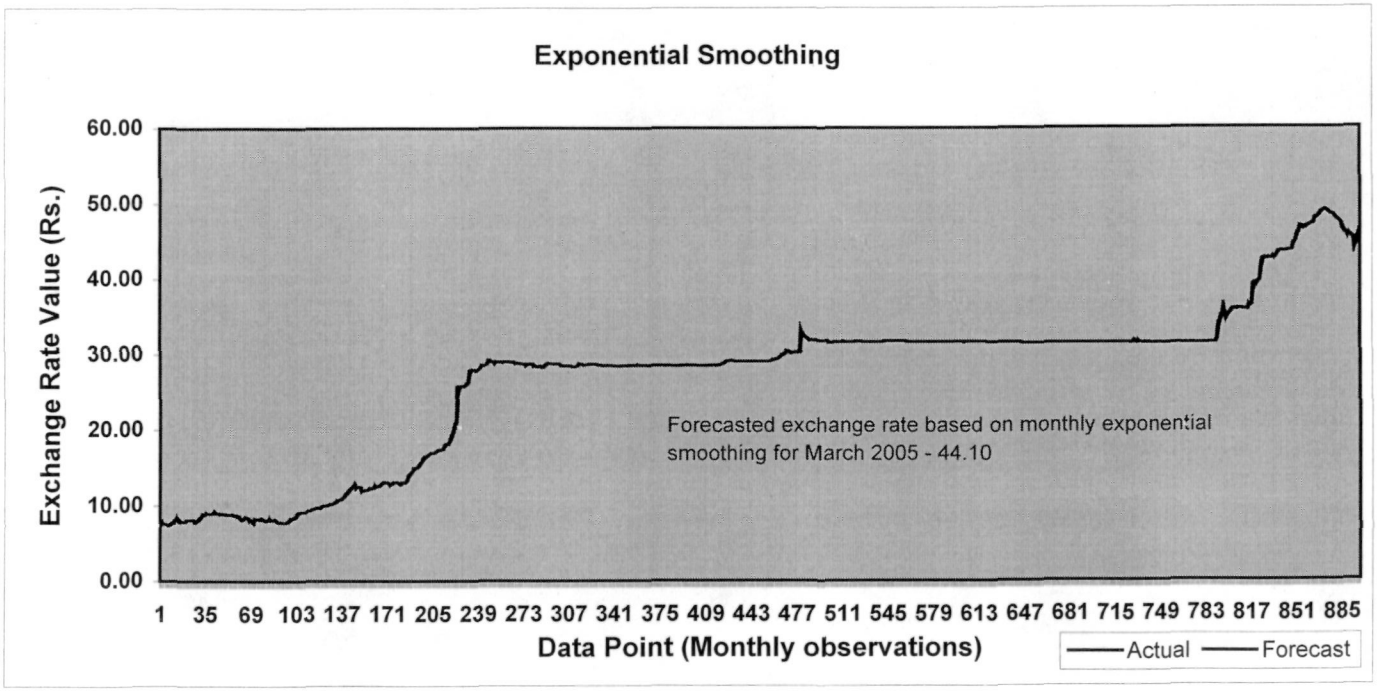
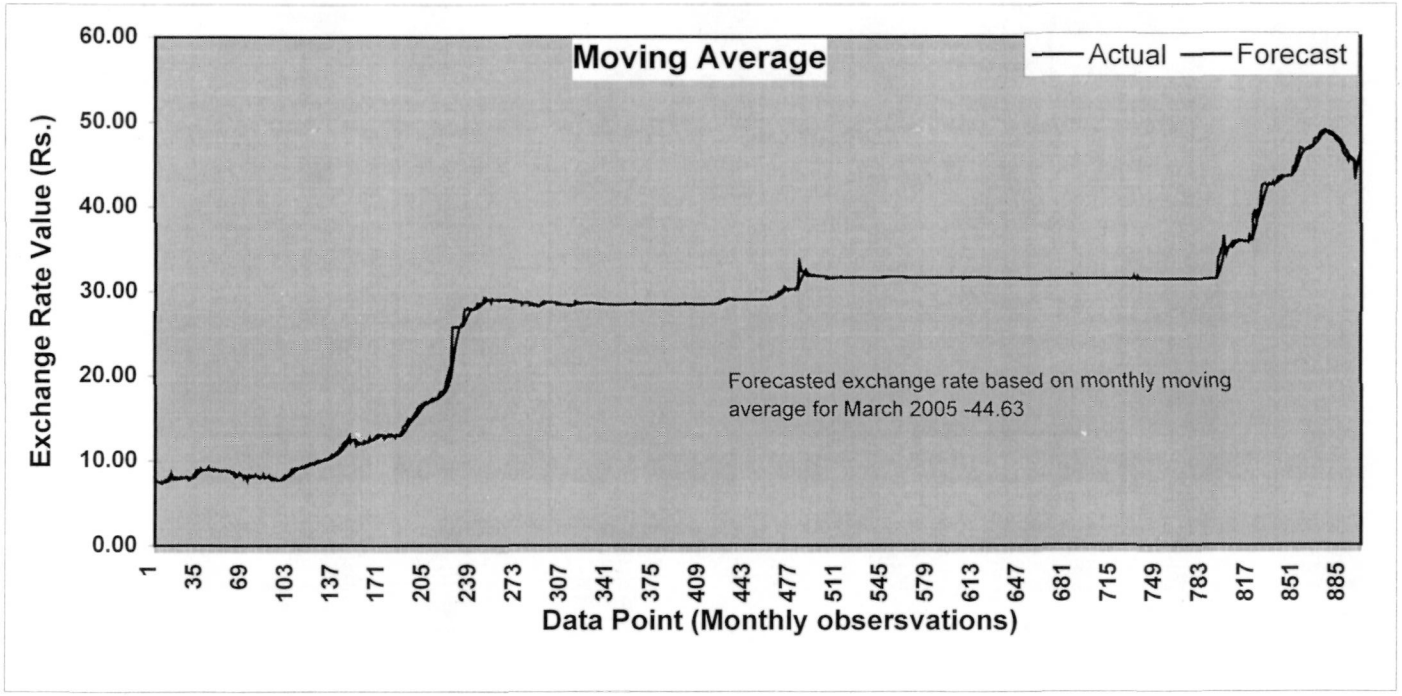


Chart - 5.17 Forecasting based on Monthly Moving Average



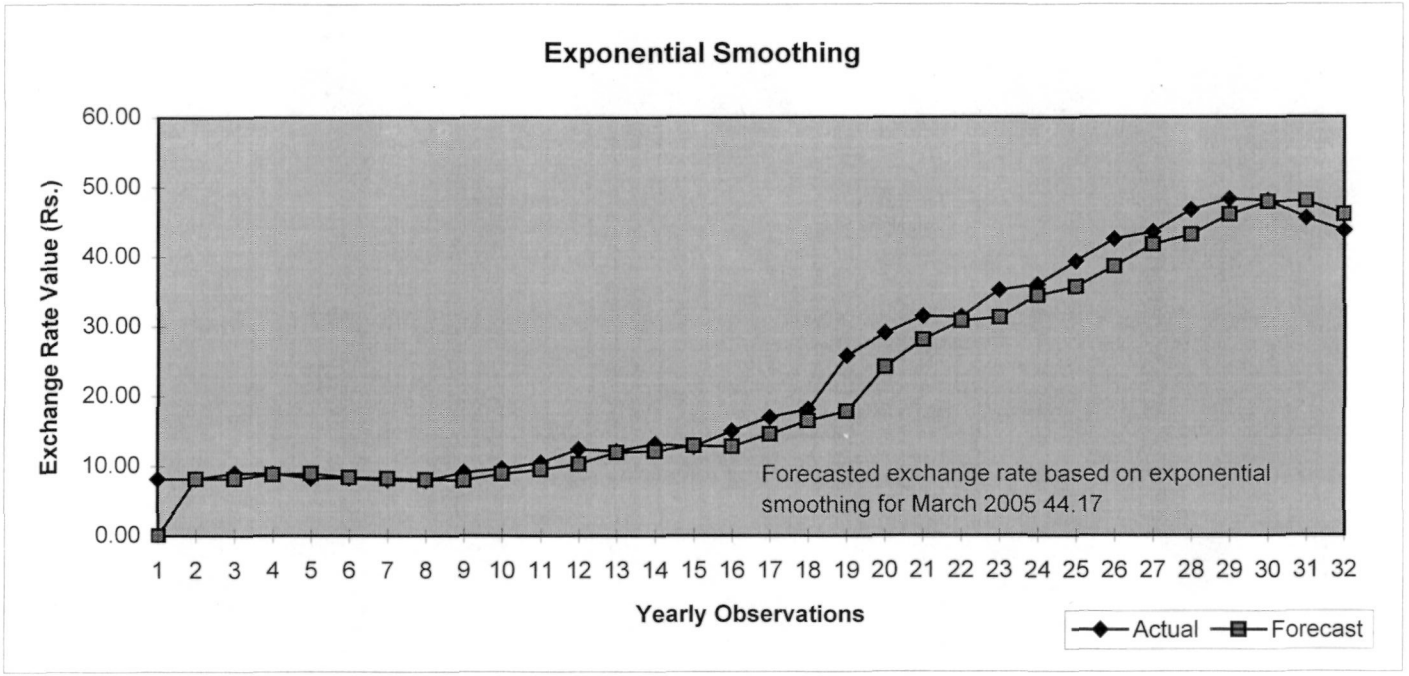
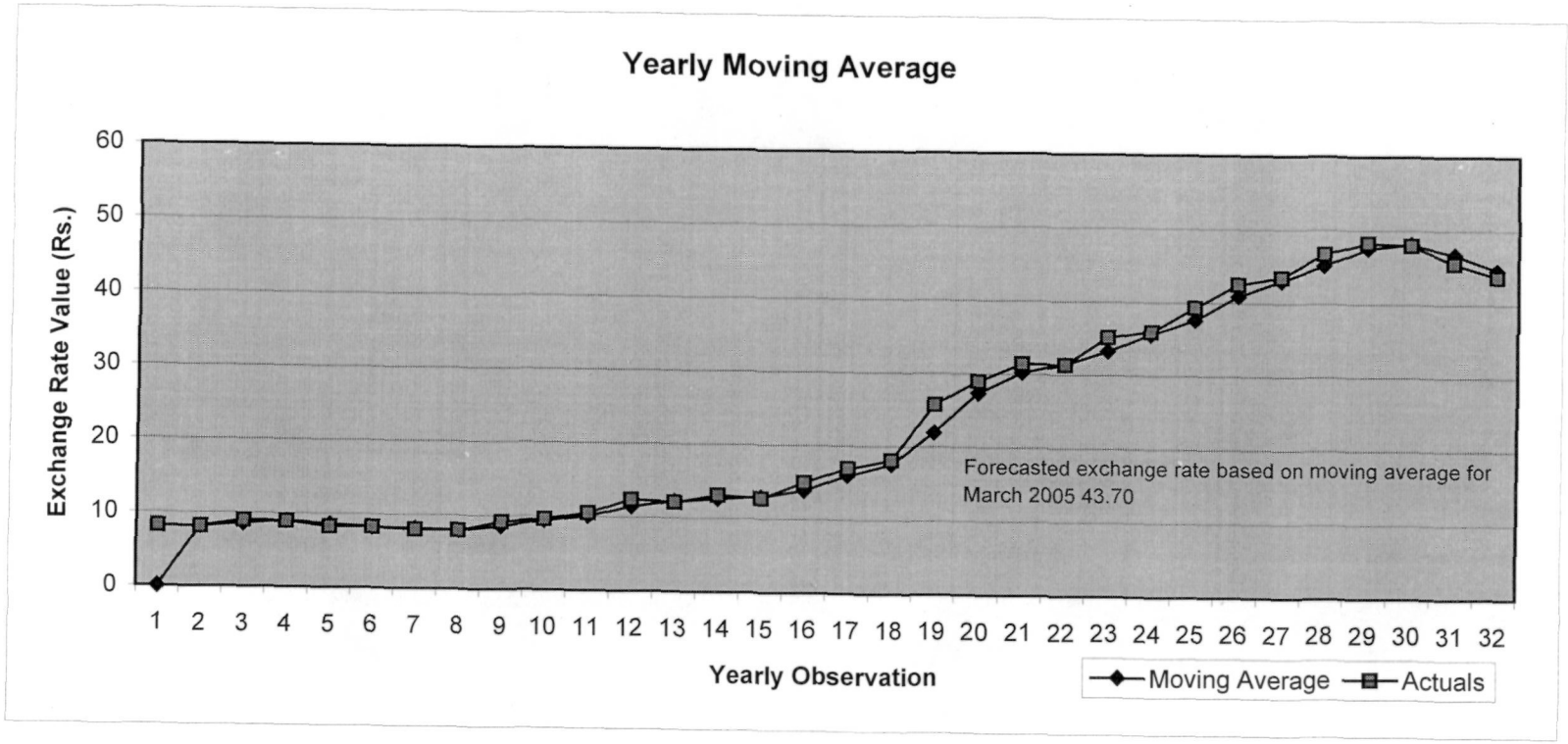

Exponential Smoothing
Exchange Rate Value (Rs.)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Yearly Observations
Forecasted exchange rate based on exponential smoothing for March 2005 44.17
Actual
Forecast

Chart 5.19 Forecasting based on Yearly Moving Average



5.21 Chapter Summary

1. In this chapter, the daily exchange rates of the Rupee against the US Dollar from January 1973 to November 2004 were studied and it was found that the Rupee exchange rates have followed a linear depreciating trend from 1973 to June 2002. From July 2002, they have turned volatile. Monte Carlo simulation results show that the exchange rate of the Rupee against the Dollar is volatile and the rate is most likely to be in the range of Rs.44 per Dollar to Rs.47 per Dollar for the year ending March 2005.
2. Then, the relationship between the exchange rate of the Rupee against the Dollar and the nine-macroeconomic variables identified on Capital Account Convertibility has been studied. Based on the univariate analysis, it was found that the null hypothesis got rejected for eight out of nine variables. Hence, there is a relationship between bank rate, balance of payment, external debt, FDI and FII, Foreign Exchange Reserves, GDP, Gross Fiscal Deficit, Inflation and the exchange rate of the Rupee against the Dollar. Only in the case of US Federal Interest Rate and the Exchange Rate of the Rupee against the Dollar, the null hypothesis of no linear relationship between the two variables is accepted at 5% level of significance. However, it is significant at 8.55% level based on the "P" value given in the summary output. In other words, if we increase the level of significance to 8.55% then the null hypothesis is rejected and there is a relationship between the exchange rate of the Rupee against the Dollar and the US Federal Interest Rate.
3. Multivariate regression analysis using all the nine-macroeconomic variables was made and it was found that there is a very strong linear relationship between the dependent variable (exchange rate of Rupee against Dollar) and the nine independent variables (bank rate, balance of payment, external debt, FDI and FII, Foreign Exchange Reserves, GDP, Gross Fiscal Deficit, Inflation and US Federal Interest Rate). The statistical validity test ANOVA also overwhelmingly rejects the null hypothesis of no linear relationship between the dependent variable and the set of independent variables already mentioned above. Then six of the significant independent variables using the "P" (Probability significance) value were selected. They are external debt, foreign exchange reserves, GDP, US Federal Interest Rate, Bank Rate and Gross Fiscal Deficit. Multivariate analysis using the six significant variables was made and it

was found that the results are equally good and the differences are only marginal in the correlation value, r^2 value and the adjusted r^2 value.

4. The forecast exchange rate of the Rupee against the Dollar based on all the nine variables using the multivariate analysis model comes to Rs.44.55 per Dollar for March 2005.

The forecasted exchange rate for March 2005 based on the six significant variables comes to 45.91.The forecasting of the exchange rates based on time series regression analysis taking the daily data from January 1973 to November 2004 was made and the rates obtained for the Rupee against the Dollar for the month of December 2004 is Rs.47.14 per Dollar; for January 2005 it is Rs.47.27 per Dollar; and for February 2005, it is Rs.47.39 per Dollar. This method of forecasting is influenced very much by the past data, which showed a linear depreciating trend and hence is not very reliable in the current volatile exchange rate movement. The forecasting of the exchange rates based on exponential smoothing method taking the monthly data and the yearly data from 1973 to 2004 was made. The forecasted exchange rate based on the monthly exponential smoothing is Rs.44.10 per Dollar and based on the yearly exponential smoothing it is Rs.44.17 per Dollar for March 2005.

The forecasted exchange rate based on the monthly moving average is Rs.44.63 per Dollar and the yearly moving average is Rs.43.70 per Dollar for March 2005. Based on the various techniques of forecasting methods used, the likely range for the Rupee against the Dollar from December 2004 to March 2005 is Rs.43.70 per Dollar to Rs.45.91 per Dollar. The forecast rates vary due to the application of different methods of calculation.

In the next chapter – 6, a study of the risk management practices of Indian companies is attempted based on a structured questionnaire survey and personal interviews of Chief Financial Officers of Companies, Banks and Regulators.

CHAPTER - 6

IMPLICATIONS OF EXCHANGE RATE MANAGEMENT FOR INDIAN COMPANIES

This chapter reports the findings of an empirical study on the foreign exchange risk management practices of 54 companies in India. It is based on a questionnaire survey conducted in 2004. (Questionnaire is given in Appendix -1).

Two case studies, one on Infosys Technologies Limited, highlighting their corporate risk management practices and another on Orchid Pharmaceuticals and Chemicals Limited highlighting their use of swap are presented.

6.1 Methodology of the empirical study

125 Chennai-based companies were identified, which had exposure to foreign exchange on account of imports, exports or foreign currency loans from the database of Center for Monitoring Indian Economy. Structured questionnaires were sent to the Chief Financial Officers of these companies and 54 responses were obtained and the analysis of the above is covered in this Chapter. The response rate of 43.2.percent is quite high for a survey of this type. One may assume that the high participation rate was due to the strong interest the Chief Financial Officers of the Companies took in the problem discussed. The Statistical Package for Social Sciences (SPSS) has been used for the above analysis. The aim of the study was to find out how these firms manage their foreign exchange risk and which instruments they use for hedging foreign exchange risks and the problems they encounter in the process.

6.2 Results of the empirical study

Table - 6.1(a) Paid-up Share Capital

Table 6.1(a) Paid-up Share Capital

	Frequency	Percent	Cumulative Percent
less than 1 cr.	14	25.9	25.9
1-10 cr	11	20.4	46.3
more than 10 crore	29	53.7	100.0
Total	54	100.0	

Table - 6.1(a) shows the responding companies according to their paid-up share capital. Out of the 54 companies, 14 companies had paid-up share capital of less than Rs.1.00 Crore, 11 companies had paid-up share capital of Rs.1.00 to Rs.10.00 Crores and 29 companies had paid-up share capital of more than Rs.10.00 Crores. An analysis of the industry pattern of the companies included in the study showed that the small scale, medium scale and large-scale companies are represented in the survey. Chart - 6.1(b) showing paid-up share capital of the 54 responding companies is given below:

Chart - 6.1(b) Paid-up Share Capital

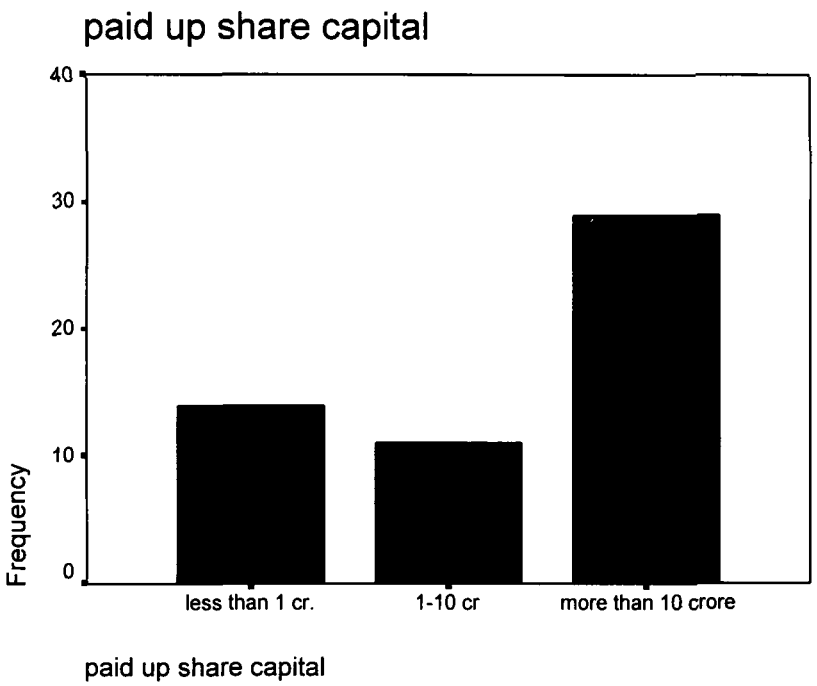


Table - 6.2(a) Type of Business

Table - 6.2(a) Type of Business			
	Frequency	Percent	Cumulative Percent
engineering	5	9.3	9.3
sugar	1	1.9	11.1
automobile	2	3.7	14.8
fertiliser	1	1.9	16.7
watches	1	1.9	18.5
garments	2	3.7	22.2
telecom	1	1.9	24.1
cycle manufacturing	1	1.9	25.9
biotech	2	3.7	29.6
communications	1	1.9	31.5
chemicals	3	5.6	37.0
auto ancillary	6	11.1	48.1
power	1	1.9	50.0
Tubes Mfg.	1	1.9	51.9
Tractors Mfg.	1	1.9	53.7
Industrial Construction	1	1.9	55.6
Boilers	1	1.9	57.4
cutting tools	1	1.9	59.3
pharma	3	5.6	64.8
software	5	9.3	74.1
financial services	8	14.8	88.9
drilling	1	1.9	90.7
shipping	2	3.7	94.4
Electronics	2	3.7	98.1
Cement	1	1.9	100.0
Total	54	100.0	

Table - 6.2(a) shows the type of businesses of the responding companies. 5 companies belonged to engineering industries, 1 sugar, 2 automobiles, 1 fertilizer, 1 watch making, 2 garment making, 1 telecom, 1 cycle manufacturing, 2 bio-tech companies, 1 communication, 3 chemicals manufacturing, 6 auto ancillary, 1 power, 1 tubes manufacturing, 1 tractor manufacturing, 1 industrial construction, 1 boiler, 1 cutting tool, 3 pharma, 5 software, 8 financial services, 1 drilling, 2 shipping, 2 electronics and 1 cement. An analysis of the industry pattern included in the study showed that most of the major industrial segments in Chennai are represented in the

survey. Chart - 6.2(b) showing the type of businesses of the 54 companies is given below:

Chart - 6.2(b) Type of Business

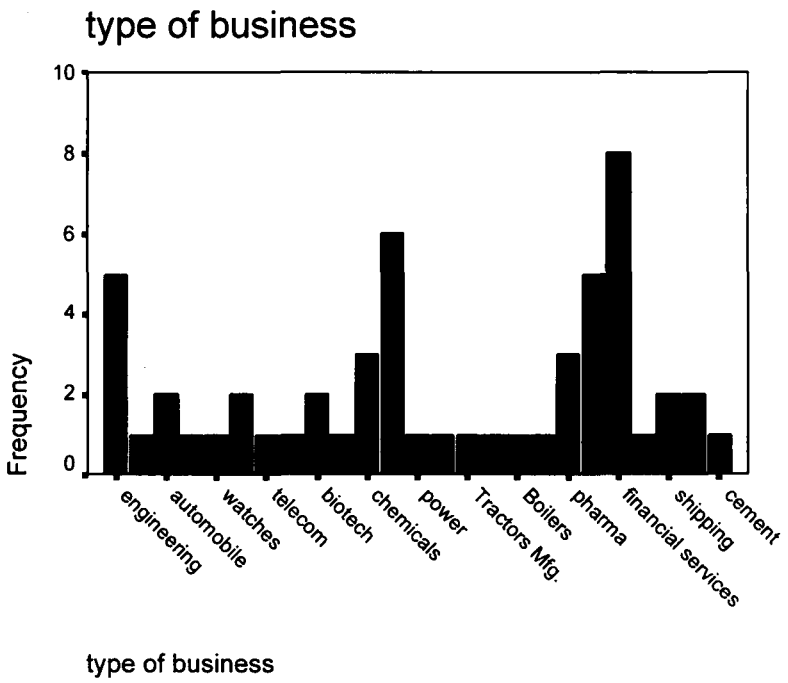
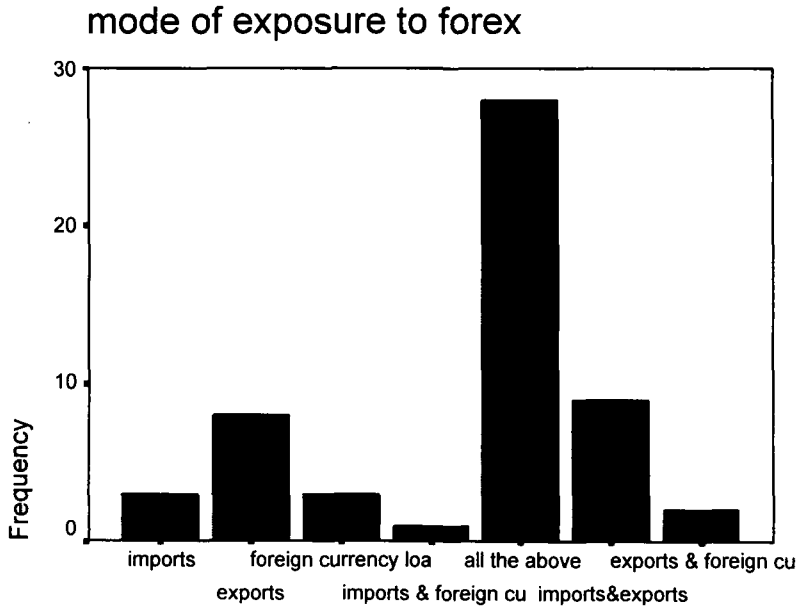


Table - 6.3(a) Mode of exposure to foreign exchange

Table - 6.3(a) Mode of Exposure to Foreign Exchange			
	Frequency	Percent	Cumulative Percent
Imports	3	5.6	5.6
Exports	8	14.8	20.4
foreign currency loans	3	5.6	25.9
imports & foreign currency	1	1.9	27.8
all the above	28	51.9	79.6
imports&exports	9	16.7	96.3
exports & foreign currency loans	2	3.7	100.0
Total	54	100.0	

Table - 6.3(a) shows the mode of exposure to foreign exchange of the responding companies. 28 companies had exposure to foreign exchange on account of imports exports and foreign currency loans. 9 companies had imports and exports only, 8 companies had only exports, 3 companies had only foreign currency loans, 2 companies had exports and foreign currency loans, 3 companies had imports only and 1 company had imports and foreign currency loans. Chart - 6.3(b) showing the mode of exposure to foreign exchange of the 54 companies is given below:

Chart - 6.3(b) Mode of Exposure to Foreign Exchange



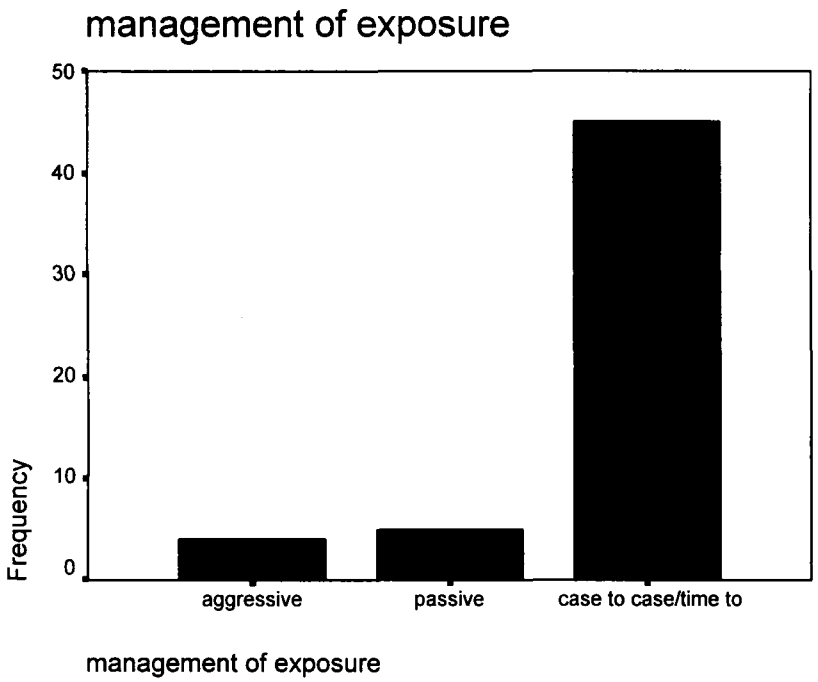
mode of exposure to forex

Table - 6.4(a) Management of foreign exchange exposure – Hedging strategies

Table - 6.4(a) Management of Exposure			
	Frequency	Percent	Cumulative Percent
aggressive	4	7.4	7.4
passive	5	9.3	16.7
case to case/time to time	45	83.3	100.0
Total	54	100.0	

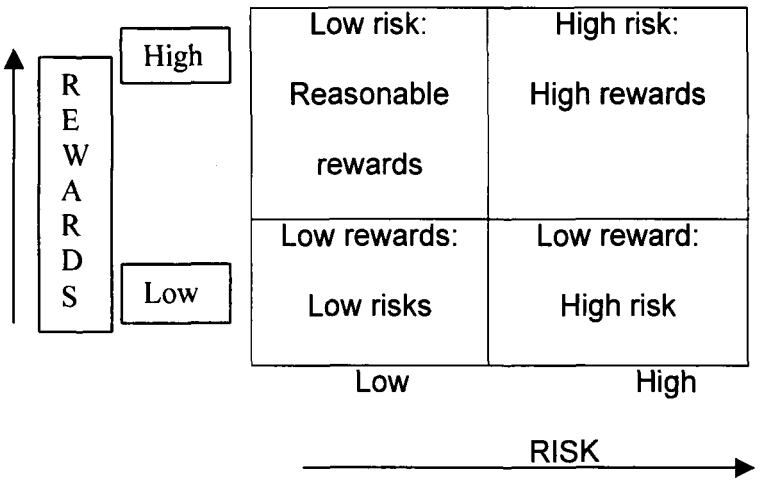
Table - 6.4(a) shows the foreign exchange exposure management strategies of the companies. 4 companies manage the exposure aggressively, 5 companies manage their exposure passively, 45 companies manage their exposure on a case-to-case and time-to-time basis. The majority of the companies followed the so-called selective hedging strategy. This means that the firms hedge only those positions for which they expect a currency loss while leaving open positions for which they expect a currency gain. Obviously, such a strategy is based on forecast of future exchange rate changes. Chart - 6.4(b) shows the foreign exchange exposure management strategies.

Chart - 6.4(b) Foreign Exchange Exposure Management Strategies.



6.3 Exposure Management

As far as exposure management strategies are concerned, a lot depends on the corporate philosophy of a company, in particular its attitude to risk. As risk and reward go hand in hand, there is no low risk, high reward strategy in real life. And if one is to look for high rewards, high risks have to be assumed. Apart from a company's willingness to take risks in pursuit of rewards, equally relevant are its financial strength and therefore ability to take risks, the nature of its business and its vulnerability to adverse movements and so on. In short there can be no single strategy, which is appropriate to all businesses. Graphically, with attitude to risk on the X-axis and the profit motivation on Y-axis, the range of strategy options could be as follows:



6.4 Low Risk: Low Reward - Passive Strategy - This option involves automatic hedging of exposures in the forward market irrespective of the attractiveness or otherwise of the forward rate. The merits of this approach are that yields and costs of the transaction are known and there is little risk of cash flow destabilization. Again, this option does not require any investment of management time or effort. The negative side is that automatic hedging at whatever rates available is hardly likely to result into optimum costs or yields. Again, under Indian exchange control, exposures cannot be hedged unless they are contractual commitments. Therefore between "conception" and "birth", the exposures remain un-hedged and have the potential to destabilize the budgeted cash flows, if the exchange rate moves in the interim. In terms of an investment strategy, this option is similar to putting all the money in the

bank deposits or AAA rated bonds (known, safe returns) and nothing in equities (uncertain, but overall higher returns).

Some company management seems to prefer this strategy on the grounds that an active management of exposure is not really their business. But this argument does not hold true in today's floating rate era, as currencies outside their home currency have assumed the characteristics of commodities. Businesses, whose costs or yields depend significantly on commodity prices, can hardly afford not to take views on the price of the commodity. Indeed, for such businesses, a significant part of the profitability would depend on purchasing the commodity at the optimum price level. The same is the case of businesses having significant exposures to other types of commodities, viz. currencies. The philosophy that currency management is not really part of one's business was perhaps appropriate in fixed exchange rate era when rate changes used to be few and far between. Given that the world has changed, this does not seem to be an optimum strategy now.

6.5 **High Risk: Low Reward – Aggressive Strategy (1)** – Perhaps the worst strategy is leaving all exposures un-hedged. The risks of destabilization of cash flows are very high. This option is similar to an investment strategy, which puts the entire portfolio in equities, with little thought having gone in selecting them.

6.6 **High Risk: High Reward – Aggressive Strategy (2)** - This strategy involves active trading in the currency market through continuous cancellations and re-bookings of forward contracts. With exchange controls in India relaxed considerably in recent times, a few of the larger companies are adopting this strategy. This requires the trading function to become a profit centre. This is a high risk: high reward strategy and if it is to be adopted, this should be done in full consciousness of the risks. In terms of an investment strategy, this option is comparable to active trading of the portfolio on expected price movements.

6.7 Low Risk: Reasonable Reward – Neutral Strategy

This strategy requires selective hedging of exposures whenever forward rates are attractive, but keeping exposures open when they are not. Successful pursuit of the strategy requires quantification of expectation about the future and the rewards would depend on the accuracy of the prediction. This option is similar to an investment strategy of a combination of bonds and equities with the proportion of the two components depending on the attractiveness of prices. A mix between bonds and equities provides an automatic hedge against the prediction of price movements going wrong.

As management of exposure and risk is an extremely important task and the effectiveness with which it is performed can have serious implications for a company's survival, Other than using particular instruments like forwards, futures or options to hedge individual exposure, these issues also need to be borne in mind:

- Company's strategic business posture
- Attitude towards risk and risk tolerance
- Organisational design to implement a coherent policy
- Monitoring and control mechanism
- Implications for performance evaluation
- Possible conflict of interest between a parent company and its global subsidiary

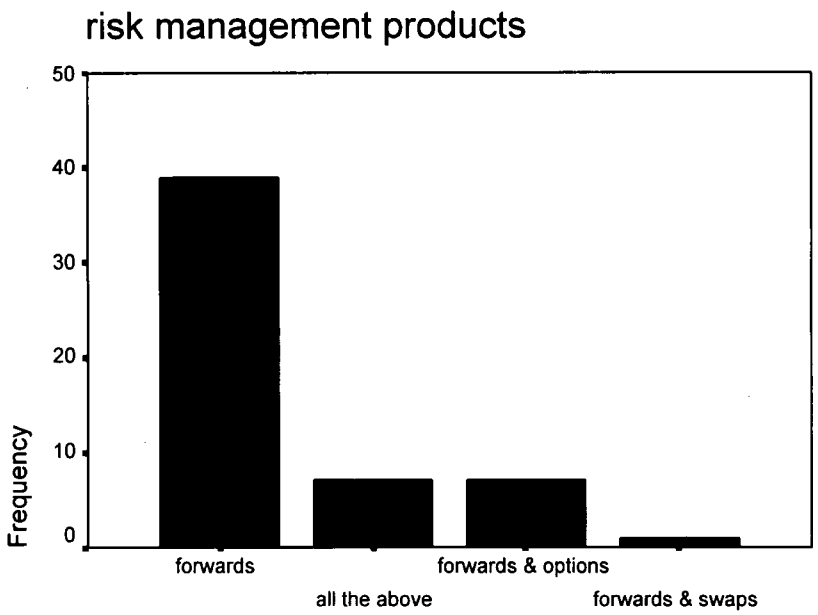
Therefore top management must get intimately involved in the process of designing the policy and ensure the participation of all those who have contribution to make and also those who might be affected by it. Again the exposure management policy and its implementation cannot be divorced from the particular set of circumstances, which condition a firm's decision-making and operations. Hence it would be impossible to attempt to provide a framework with universal applicability. Therefore, the framework should be flexible and situation specific.

Table - 6.5(a) Risk Management Products

Table - 6.5(a) Risk Management Products			
	Frequency	Percent	Cumulative Percent
forwards	39	72.2	72.2
all the above	7	13.0	85.2
forwards & options	7	13.0	98.1
forwards & swaps	1	1.9	100.0
Total	54	100.0	

Table - 6.5(a) above shows the risk management products used by the 54 responding companies. 39 companies have used only forwards for hedging their foreign exchange exposure. 7 companies have used forwards and options and 7 companies have used forwards, options and swaps 1 company has used forwards and swaps. Chart - 6.5(b) shows the risk management products used by the companies.

Chart - 6.5(b) Risk Management Products used by companies



The companies cited the following reasons for using forwards for hedging their foreign exchange exposure: -

1) Simple and easy to understand
2) Liquid and available all the time
3) Transparent
4) Cost effective
5) Useful in targeting a budgeted cost

The companies cited the following reasons for using options for hedging their foreign exchange exposure: -

(1) Strike price and premium are attractive
(2) Flexible with room to manoeuvre
(3) Gives right without obligation
(4) It is liquid and available

The companies cited the following reasons for not using options for hedging their foreign exchange exposure: -

(1) Option premium is high
(2) Minimum contract size is high
(3) Companies are not yet comfortable with the product
(4) Fear of manipulation
(5) Option quotes favour the banks only
(6) Absence of dynamic quotations

The companies cited the following reasons for using swaps for hedging their foreign exchange exposure: -

(1) For interest rate reduction
(2) It is cost effective
(3) It is transparent

The companies cited the following reasons for not using swaps for hedging their foreign exchange exposure: -

(1) The international swap dealers association agreement is too confusing
(2) The agreement has irrelevant clauses
(3) It is too lengthy

Table - 6.6(a) Uncovered foreign exchange exposure of companies

Table - 6.6(a) Uncovered Exposure			
	Frequency	Percent	Cumulative Percent
nil	15	27.8	27.8
upto 25%	12	22.2	50.0
upto 50%	20	37.0	87.0
upto 75%	4	7.4	94.4
upto 100%	3	5.6	100.0
Total	54	100.0	

Table - 6.6(a) shows the percentage of uncovered foreign exchange exposure of the 53 companies. 15 companies had no uncovered exposure, 12 companies had upto 25% uncovered exposure, 20 companies had upto 50% uncovered exposure, 4 companies had upto 75% uncovered exposure and 3 companies had 100% uncovered exposure. Chart - 6.6(b) shows the percentage of uncovered exposure of the 54 companies.

Chart - 6.6(b) Percentage of Uncovered Exposure

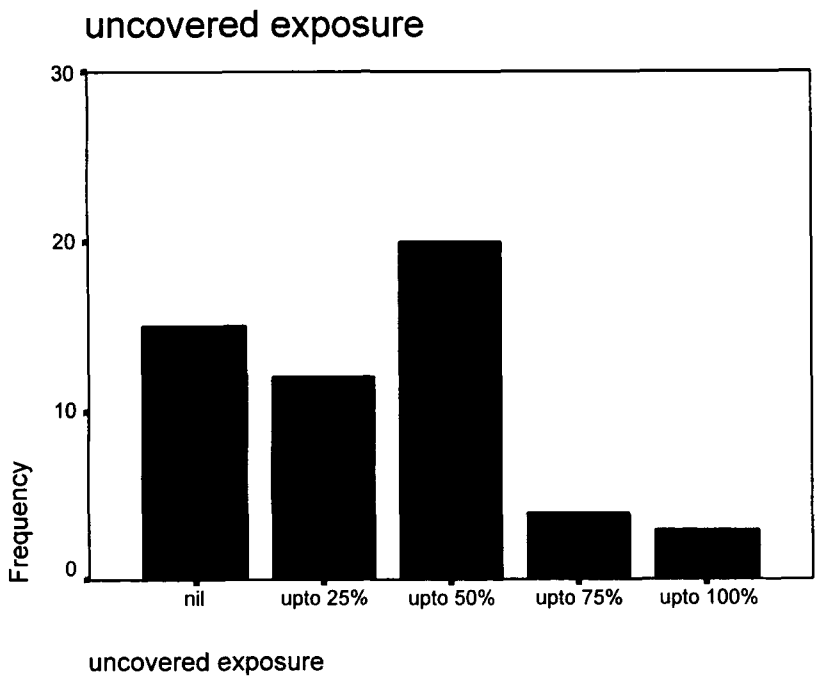


Table - 6.7(a) Forecasting Exchange Rates

Table - 6.7(a) Are you forecasting exchange rate?			
	Frequency	Percent	Cumulative Percent
yes	4	7.4	7.4
no	50	92.6	100.0
Total	54	100.0	

Table - 6.7(a) shows only 4 companies are forecasting exchange rates on their own. 50 companies do not forecast exchange rates on their own. Chart - 6.7(b) shows the same.

Chart - 6.7(b) Forecasting Exchange Rates

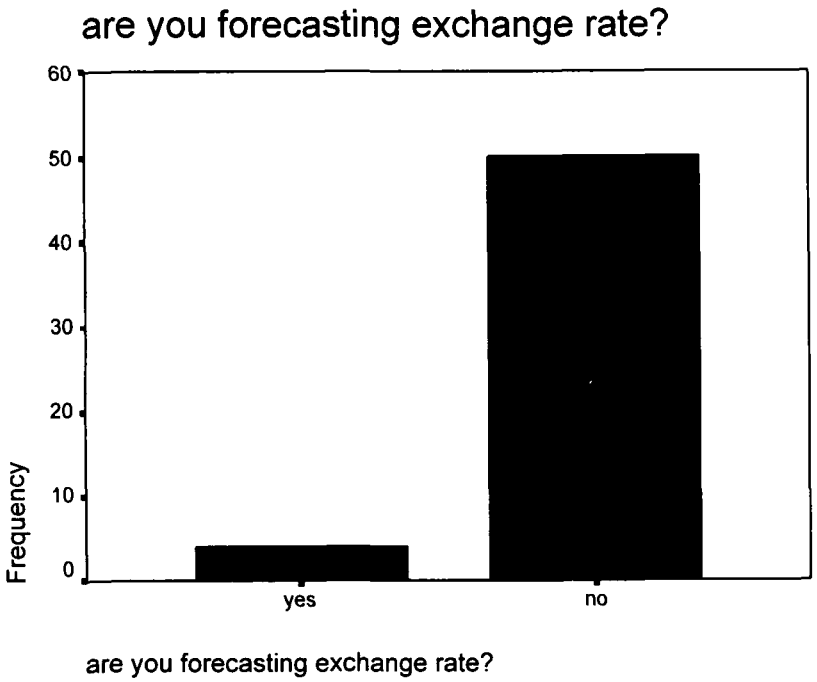


Table - 6.8(a) Bankers' and Expert opinion

Table - 6.8(a) If not forecasting			
	Frequency	Percent	Cumulative Percent
banker's opinion	12	22.2	22.2
Both	42	77.8	100.0
Total	54	100.0	

Table - 6.8(a) shows12 companies rely on bankers' opinion for managing their foreign exchange exposure. 42 companies rely on bankers' opinion as well as foreign exchange experts for managing their exposure. Chart - 6.8(b) below shows the number of companies relying on bankers' opinion alone and bankers and expert's opinion.

Chart - 6.8(b) Bankers' and Expert opinion

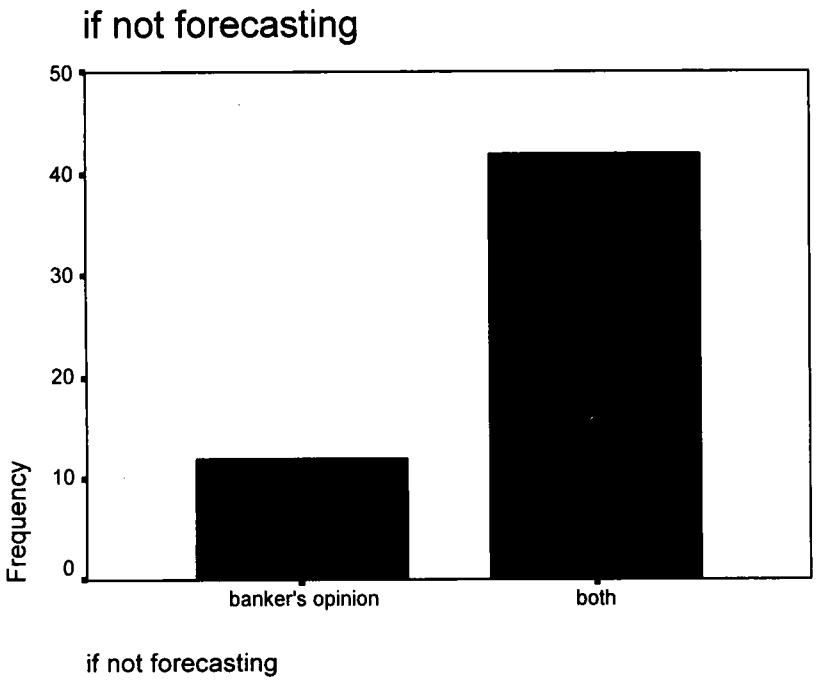


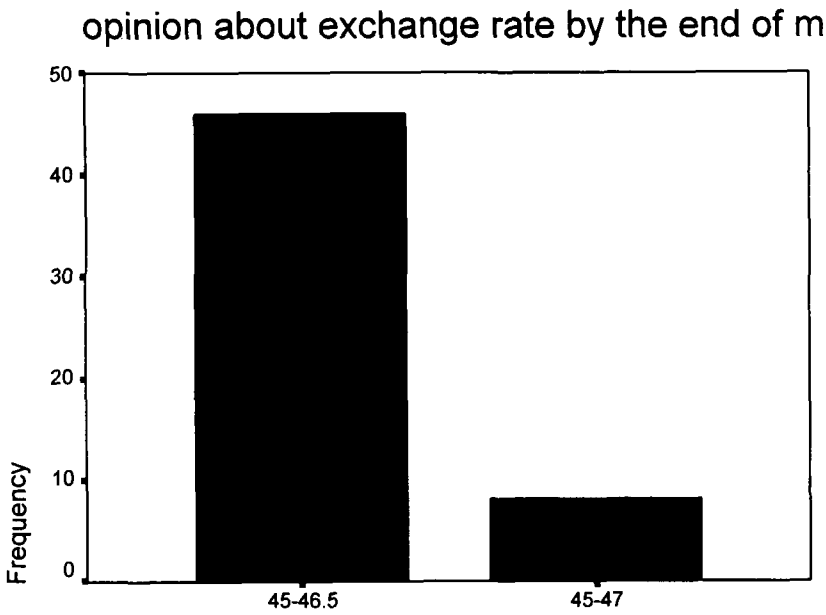
Table - 6.9(a) Forecasting exchange rates for March 2005

Table - 6.9(a) Opinion about exchange rate by the end of march 2005

	Frequency	Percent	Cumulative Percent
45-46.5	46	85.2	85.2
45-47	8	14.8	100.0
Total	54	100.0	

Table 6.9(a) shows the expectation on the exchange rate of the Rupee against the Dollar. 46 companies feel the rates will move in the range of Rs.45 to Rs.46.50 per Dollar. 8 companies feel, it will be in the range of Rs.45 to Rs.47 per Dollar. The same is shown in Chart 6.9(b).

Chart - 6.9(b) Forecasting exchange rates for March 2005



opinion about exchange rate by the end of march 2005

Table - 6.10(a) Mode of exposure to foreign exchange and Management of Exposure

Table - 6.10(a) Mode of Exposure to Foreign Exchange and Management of Exposure					
		management of exposure			Total
		aggressive	passive	case to case/time to time	
mode of exposure to forex	imports		1	2	3
	exports	1	2	5	8
	foreign currency loans	1		2	3
	imports & foreign currency			1	1
	all the above	1	2	25	28
	imports&exports	1		8	9
	exports & foreign currency loans			2	2
Total		4	5	45	54

Table - 6.10(a) shows how the 54 companies managed their foreign exchange exposures using risk management strategies. 4 companies followed aggressive strategy, 5 companies followed passive strategy and 45 companies relied on case-to-case and time-to-time strategy.

Chart - 6.10(b) Mode of exposure to foreign exchange and management of exposure

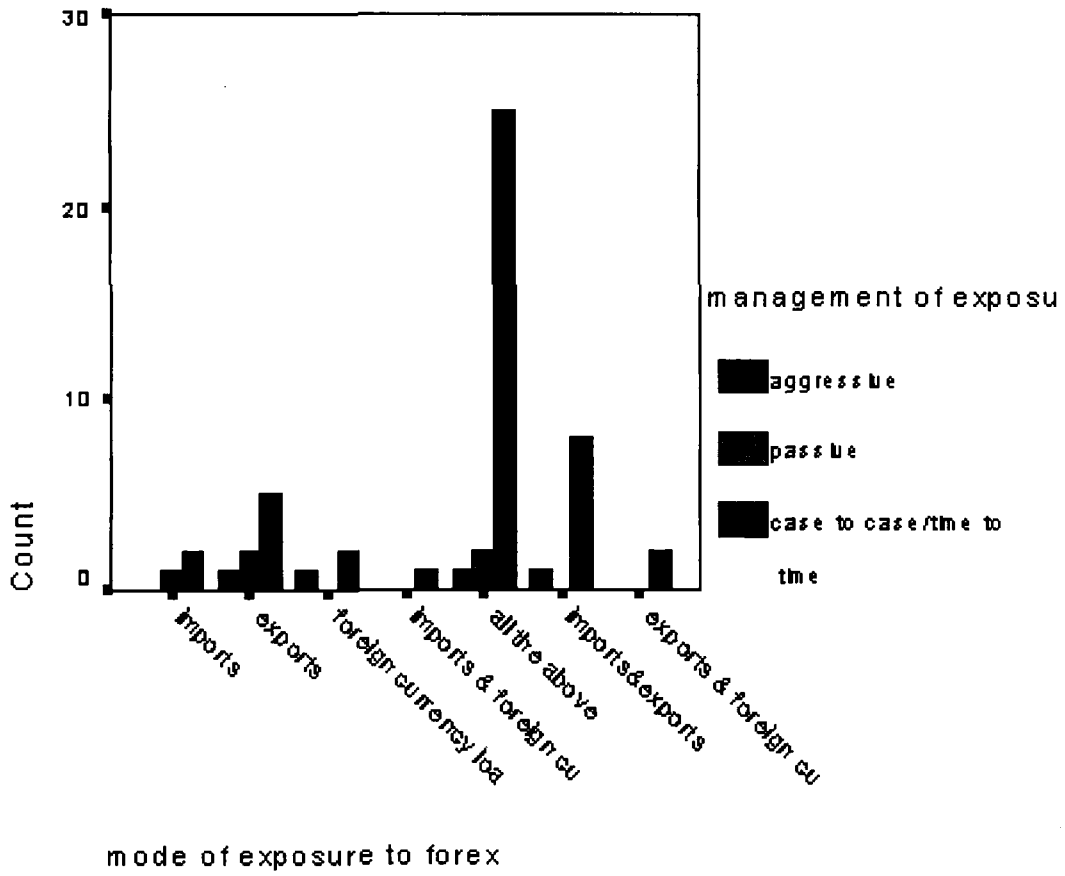


Table - 6.11(a) Mode of exposure to foreign exchange and risk management products

Table - 6.11(a) Mode of Exposure to Foreign Exchange and Risk Management Products

		risk management products				Total
		forwards	all the above	forwards & options	forwards & swaps	
mode of exposure to forex	imports	3				3
	exports	6		2		8
	foreign currency loans		2	1		3
	imports & foreign currency			1		1
	all the above	21	5	1	1	28
	imports&exports	8		1		9
	exports & foreign currency loans	1		1		2
Total		39	7	7	1	54

Table - 6.11(a) shows the mode of exposure to foreign exchange and the risk management products used by the corporates to manage the exposure. 39 companies used forwards only, 7 companies used forwards, options and swaps, 7 companies used forwards and options and 1 company used forwards and swaps.

Chart - 6.11(b) Mode of exposure to foreign exchange and risk management products

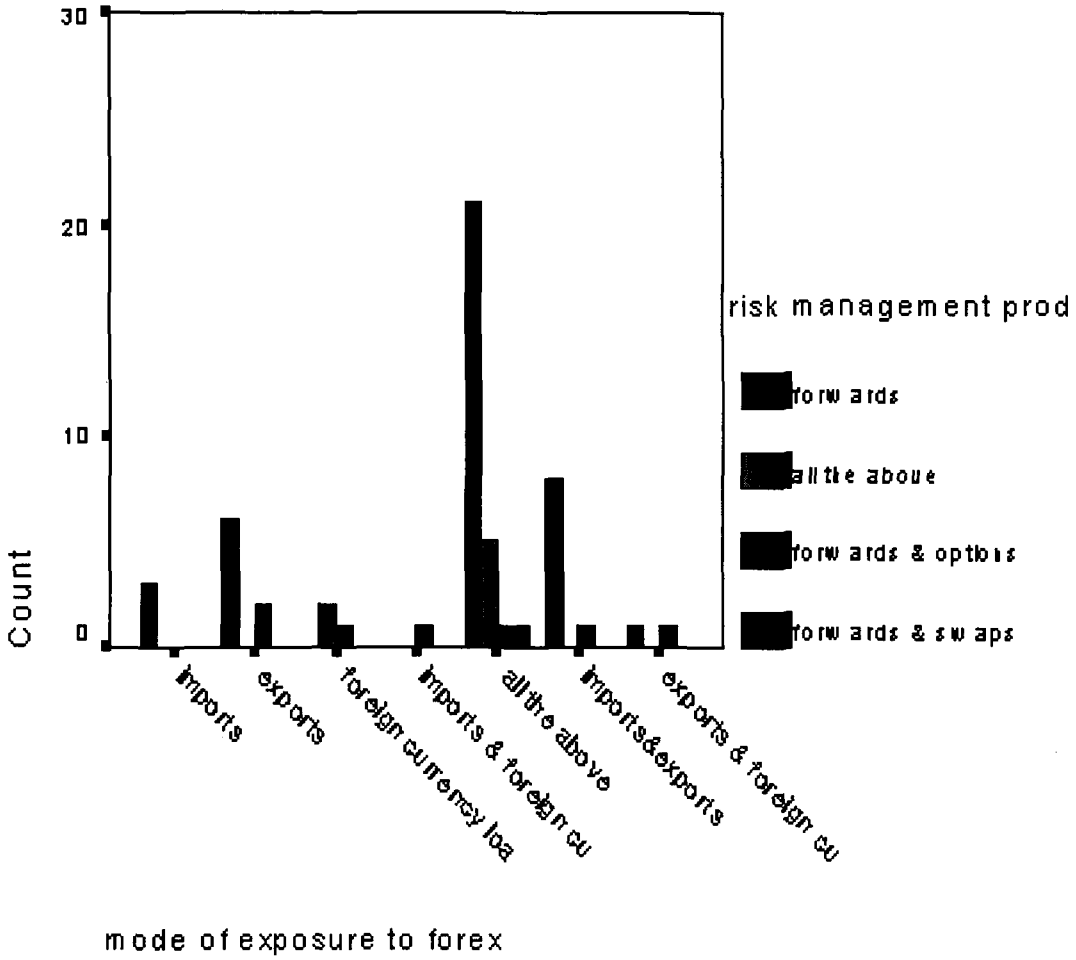


Table - 6.12(a) Mode of Exposure to Foreign Exchange and Uncovered Exposure

Table - 6.12(a) Mode of Exposure to Foreign Exchange and Uncovered Exposure							
		uncovered exposure					Total
		nil	upto 25%	upto 50%	upto 75%	upto 100%	
mode of exposure to forex	imports		2	1			3
	exports	2	1	3	1	1	8
	foreign currency loans		2	1			3
	imports & foreign currency		1				1
	all the above	13	3	8	3	1	28
	imports&exports		2	6		1	9
	exports & foreign currency loans		1	1			2
Total		15	12	20	4	3	54

Table - 6.12(a) shows the mode of exposure to foreign exchange for the 54 companies and the uncovered exposure of these companies. 15 companies had nil uncovered position, 12 companies had upto 25% uncovered position, 20 companies had upto 50% uncovered position, 4 companies had upto 75% uncovered position and 3 companies had upto 100% uncovered exposure.

Chart - 6.12(b) Mode of Exposure to Foreign Exchange and Uncovered Exposure

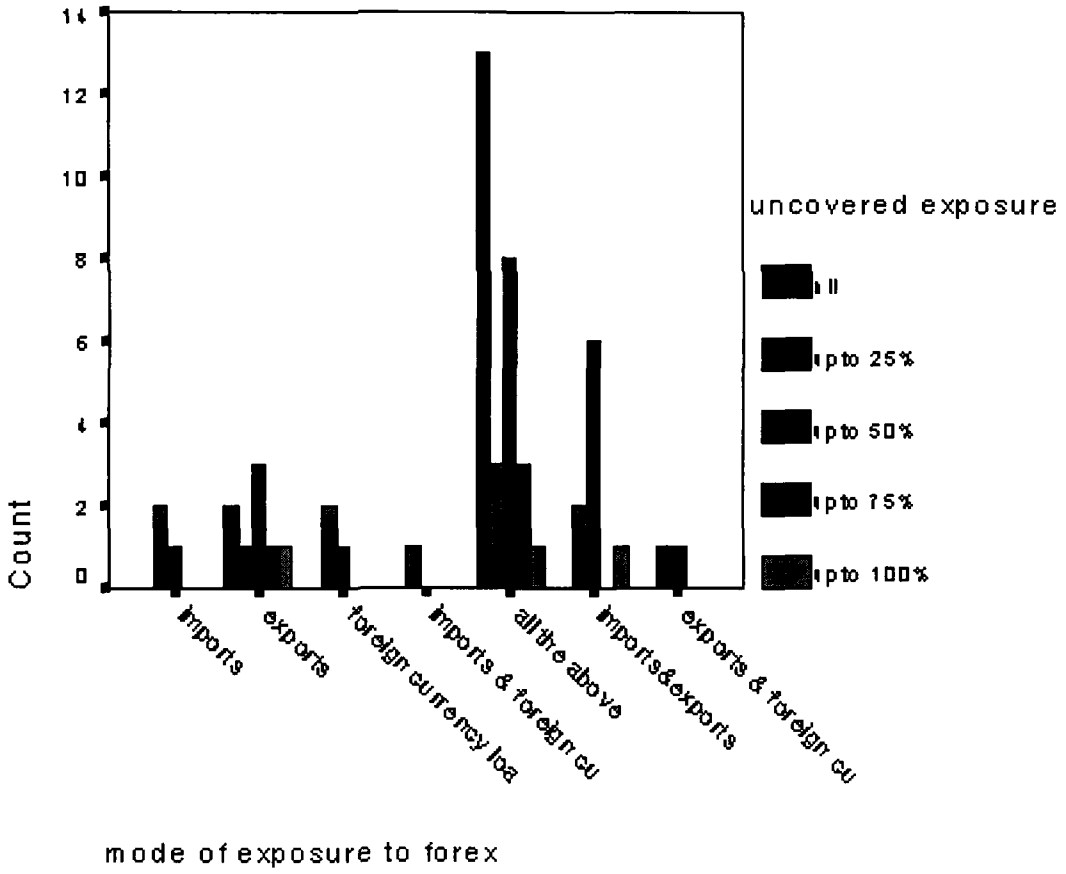


Table - 6.13(a) Management of exposure and Risk Management Products

Table - 6.13(a) Management of Exposure and Risk Management Products					
		management of exposure			Total
		aggressive	passive	case to case/time to time	
risk management products	forwards	2	5	32	39
	all the above	2		5	7
	forwards & options			7	7
	forwards & swaps			1	1
Total		4	5	45	54

Table - 6.13(a) shows management of exposure of the 54 companies and the risk management products they used for the above. 4 companies had aggressive risk management strategy and out of them 2 used only forwards and the other two used forwards, options and swaps. 5 companies were passive in their risk management strategy and they used forwards only. 45 companies managed their risk on a case-to-case and time-to-time basis and of these, 32 used only forwards, 5 used forwards, options and swaps, 7 used forwards and options and 1 forwards and swaps.

Chart - 6.13(b) Management of exposure and Risk Management Products

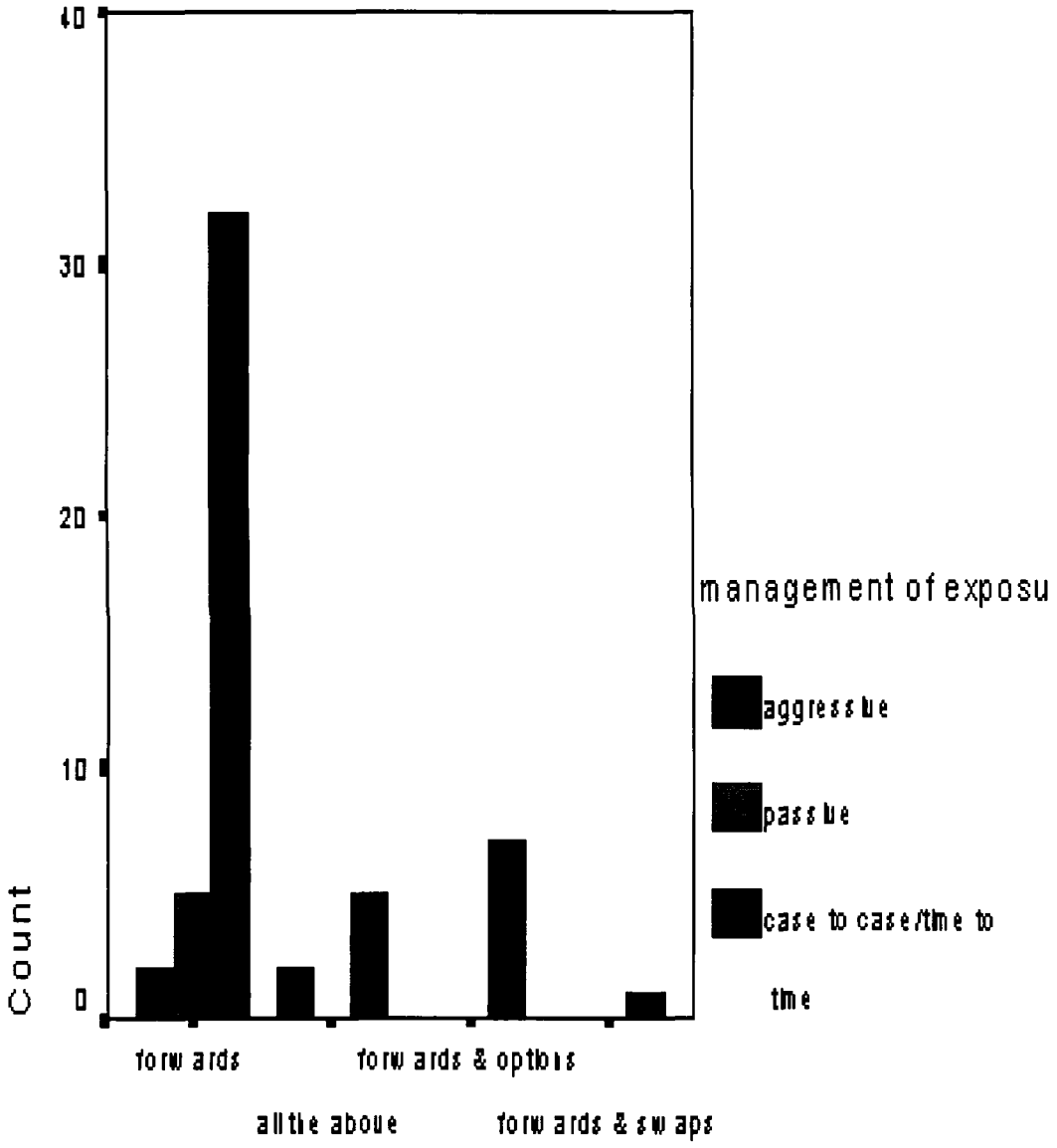


Table – 6.14(a) Type of business and management of exposure

Table - 6.14(a) Type of business and Management of Exposure					
		management of exposure			Total
		aggressive	passive	case to case/time to time	
type of business	engineering		1	4	5
	sugar			1	1
	automobile			2	2
	fertiliser			1	1
	watches			1	1
	garments		1	1	2
	telecom			1	1
	cycle manufacturing			1	1
	biotech			2	2
	communications	1			1
	chemicals			3	3
	auto ancillary		1	5	6
	power			1	1
	Tubes Mfg.			1	1
	Tractors Mfg.			1	1
	Industrial Construction			1	1
	Boilers			1	1
	cutting tools			1	1
	pharma			3	3
	software		1	4	5
	financial services	2		6	8
	drilling			1	1
	shipping		1	1	2
	electronics	1		1	2
	cement			1	1
Total		4	5	45	54

Table - 6.14(a) shows the type of business and how the 54 companies manage their exposure using risk management strategies. 1 communication company, 2 financial services companies and 1 electronics company used aggressive risk management strategy. 1 engineering company, 1 garment manufacturer, 1 auto ancillary, 1 software company and 1 shipping company used passive risk management strategy.

The rest of the 45 companies belonging to various industries followed a case-to-case and time-to-time strategy for managing their exposure.

Chart - 6.14(b) Type of business and management of exposure

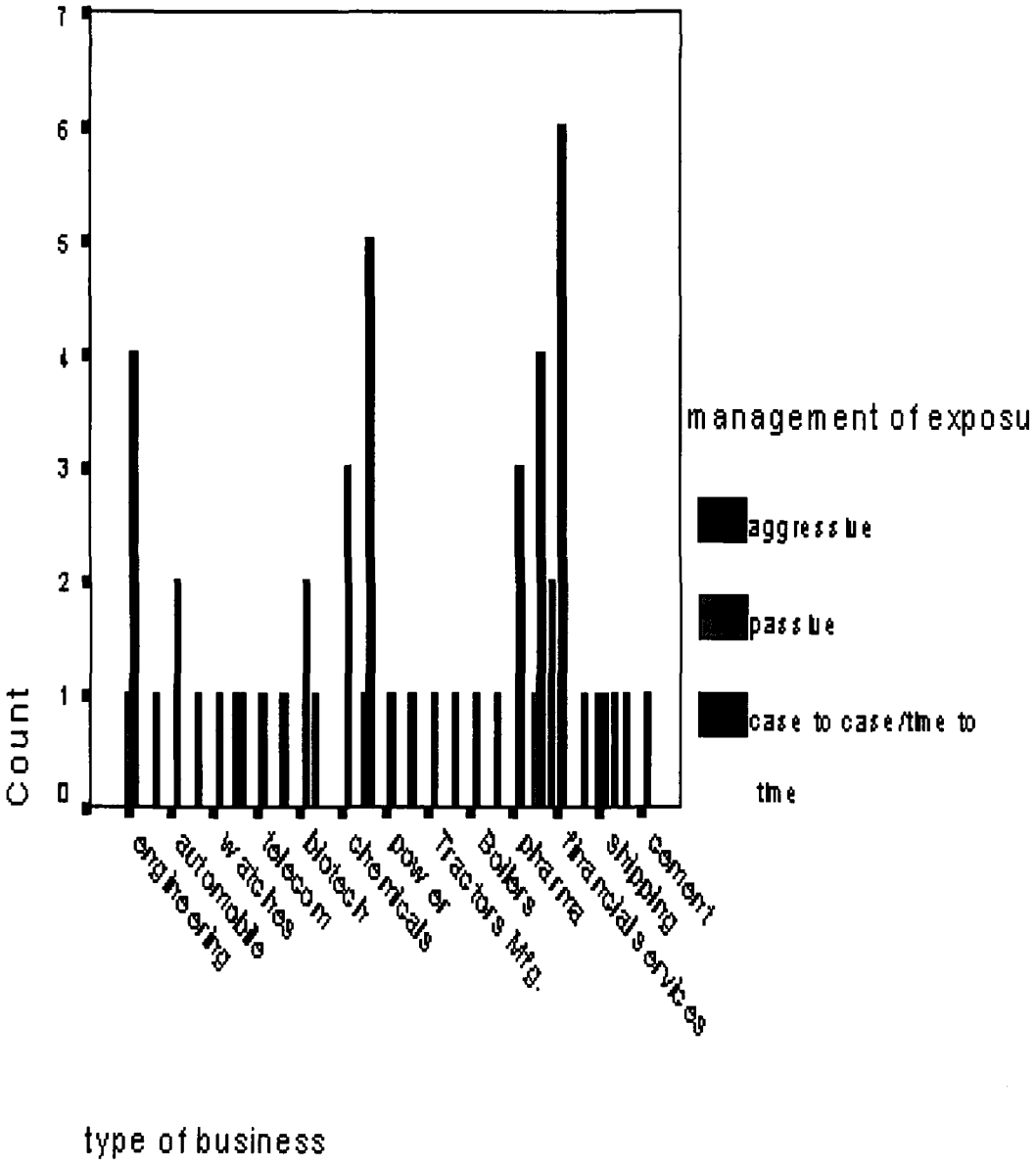


Table - 6.15(a) Type of business and uncovered exposure

Table - 6.15(a) Type of Business and Uncovered Exposure							
		uncovered exposure					Total
		nil	upto 25%	upto 50%	upto 75%	upto 100%	
type of business	engineering	2	1	2			5
	sugar				1		1
	automobile			2			2
	fertiliser				1		1
	watches					1	1
	garments	1		1			2
	telecom			1			1
	cycle manufacturing		1				1
	biotech	1	1				2
	communications				1		1
	chemicals	2		1			3
	auto ancillary	2	1	3			6
	power	1					1
	Tubes Mfg.		1				1
	Tractors Mfg.			1			1
	Industrial Construction					1	1
	Boilers			1			1
	cutting tools		1				1
	pharma	2	1				3
	software	2	1	2			5
	financial services		2	5	1		8
	drilling			1			1
	shipping	1				1	2
	electronics	1	1				2
	cement		1				1
Total		15	12	20	4	3	54

Table - 6.15(a) shows the type of business and the uncovered foreign exchange exposure. 15 companies had nil uncovered exposure, 12 companies had upto 25% uncovered exposure, 20 companies had upto 50% uncovered exposure, 4 companies had upto 75% uncovered exposure and 3 companies had upto 100% uncovered exposure.

Chart - 6.15(b) Type of business and uncovered exposure

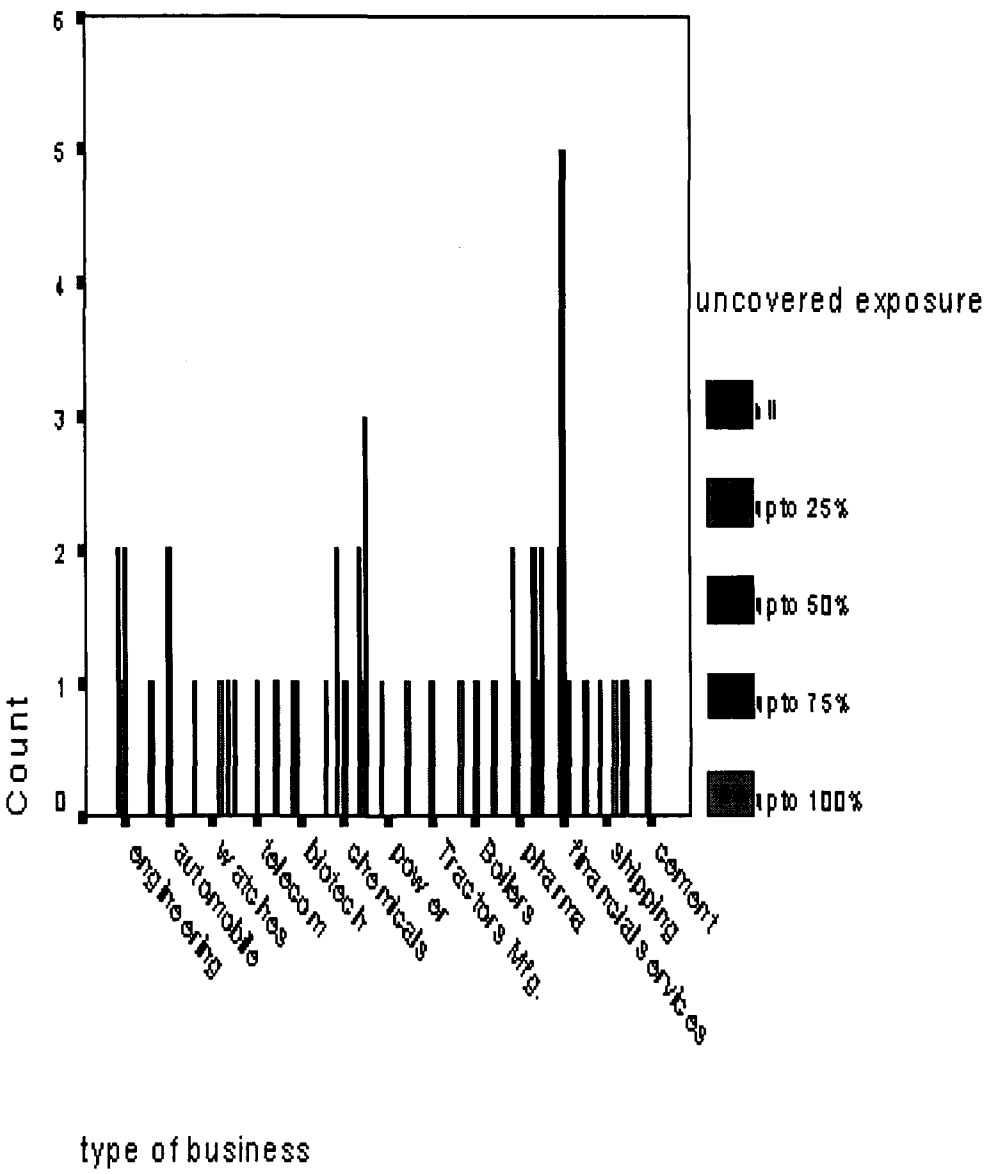


Table - 6.16(a) Management of Exposure and Uncovered Exposure

Table - 6.16(a) Management of Exposure and Uncovered Exposure					
		management of exposure			Total
		aggressive	passive	case to case/time to time	
uncovered exposure	nil		2	13	15
	upto 25%	2	2	8	12
	upto 50%	1		19	20
	upto 75%	1		3	4
	upto 100%		1	2	3
Total		4	5	45	54

Table - 6.16(a) shows the management of exposure of the companies and the uncovered exposure. Out of the 4 aggressive risk management companies, 2 had uncovered exposure upto 25%, 1 had upto 50% and one had upto 75%. Out of the 5 passive risk management companies, 2 had nil uncovered exposure, 2 had upto 25% and 1 had upto 100%. Out of the 45 companies managing their risk on a case-to-case and time-to-time basis, 13 had nil uncovered exposure, 8 had upto 25%, 19 had upto 50%, 3 had upto 75% and 2 had upto 100%.

Chart - 6.16(b) Management of Exposure and uncovered exposure

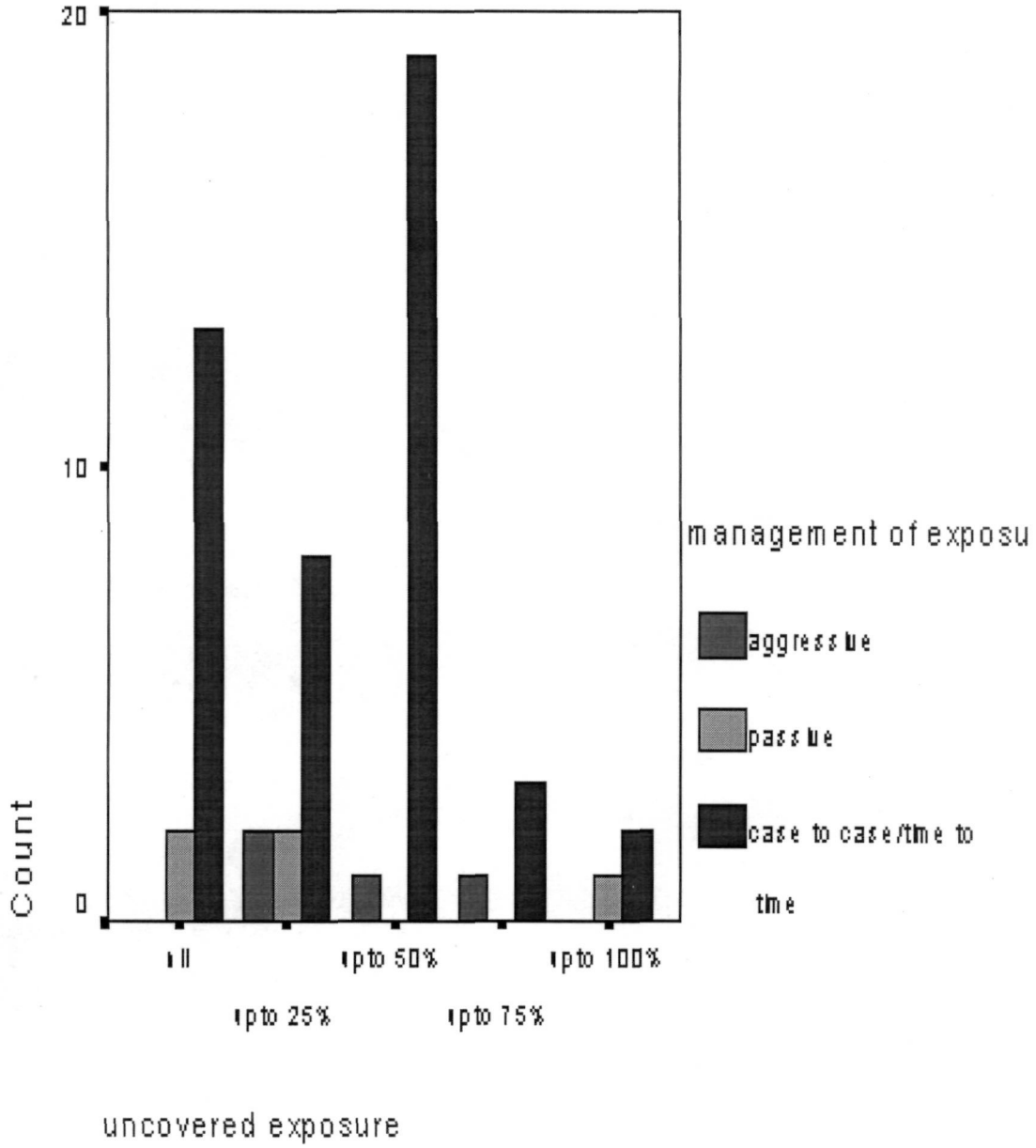


Table - 6.17(a) Paid up share capital and risk management products

Table - 6.17(a) Paid-up Share Capital and Risk Management Products						
		risk management products				Total
		forwards	all the above	forwards & options	forwards & swaps	
paid up share capital	less than 1 cr.	10		4		14
	1-10 cr	10	1			11
	more than 10 crore	19	6	3	1	29
Total		39	7	7	1	54

Table - 6 17(a) shows the paid-up share capital and the risk management products used by the companies. Out of the 14 companies having paid-up share capital of less than 1.00 crore, 10 used only forwards and 4 used forwards and options. Out of the 11 companies having paid up share capital of Rs.1 to Rs.10 Crores, 10 used only forwards and 1 company used forwards, options and swaps. Out of the 29 companies having paid-up share capital of more than Rs.10.00 Crores, 19 used only forwards, 6 used forwards, options and swaps, 3 used forwards and options and 1 used forwards and swaps.

Chart - 6.17(b) Paid up share capital and risk management products

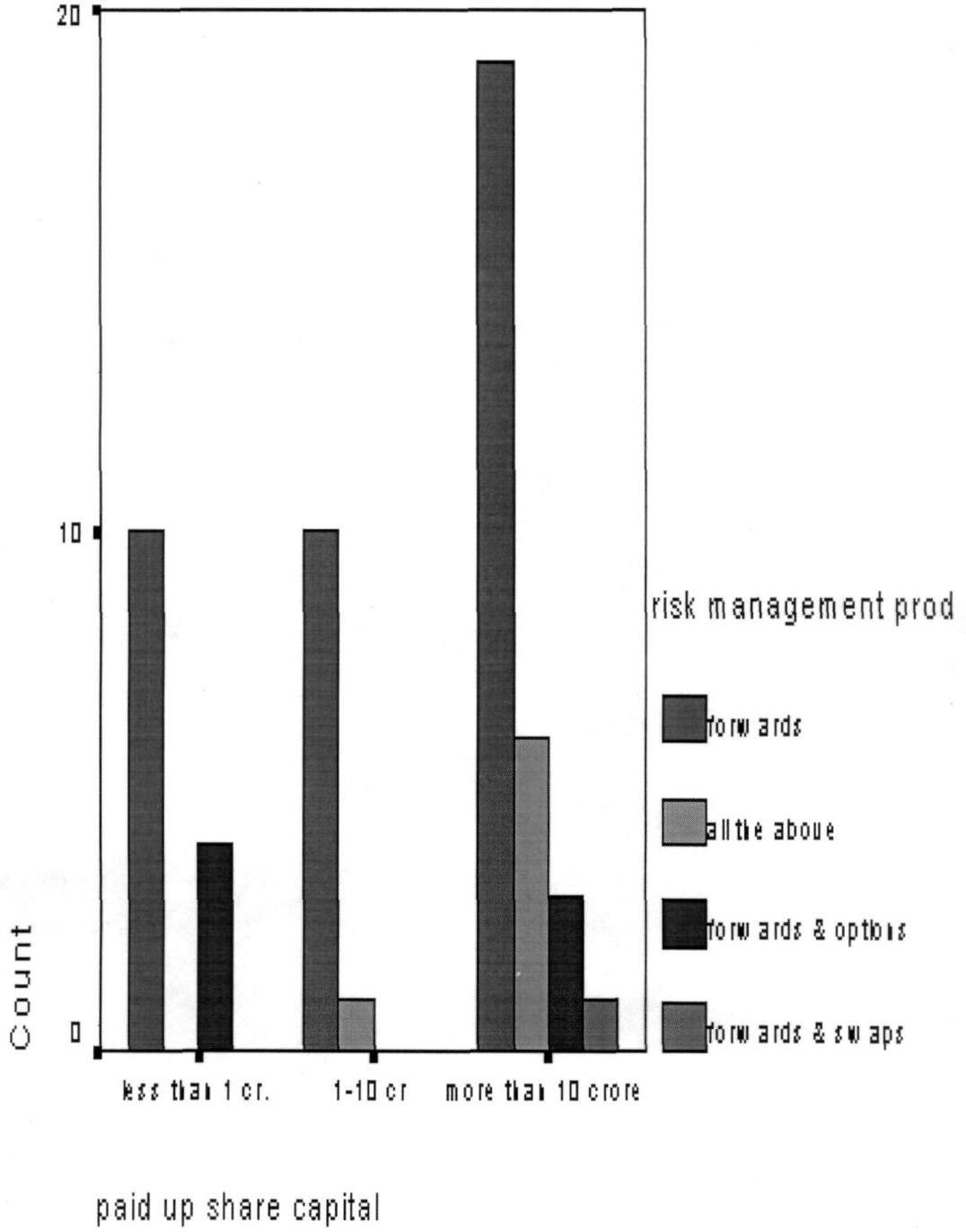
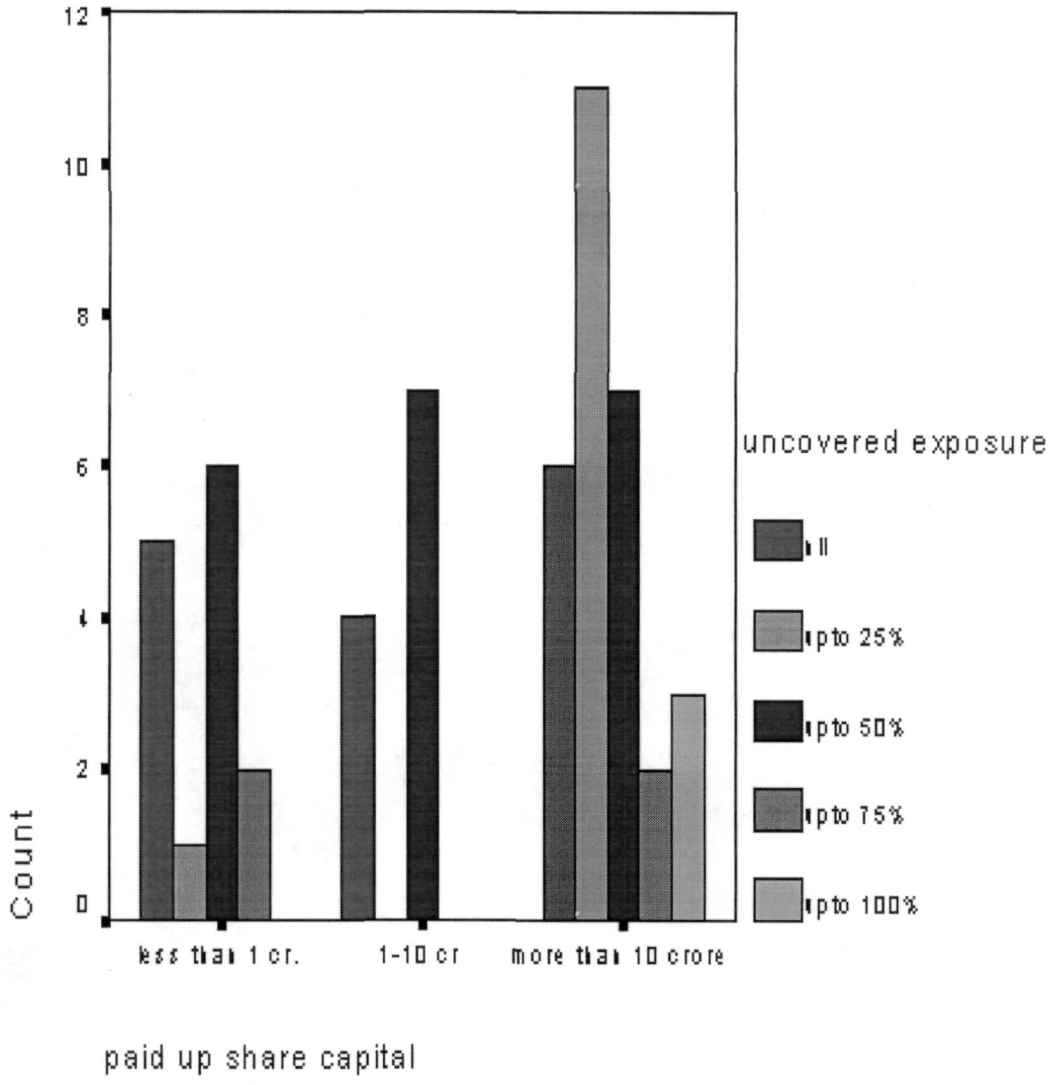


Table - 6.18(a) Paid-up Share Capital and Uncovered Exposure

Table - 6.18(a) Paid up Share Capital and Uncovered Exposure							
		uncovered exposure					Total
		nil	upto 25%	upto 50%	upto 75%	upto 100%	
paid up share capital	less than 1 cr.	5	1	6	2		14
	1-10 cr	4		7			11
	more than 10 crore	6	11	7	2	3	29
Total		15	12	20	4	3	54

Table - 6 18(a) shows the paid-up share capital and the uncovered exposure of companies. Out of the 14 companies having less than Rs.1.00 Crore paid-up share capital, 5 companies had nil uncovered position, 1 company had upto 25% uncovered exposure, 6 companies had upto 50% uncovered exposure, 2 companies had upto 75% uncovered exposure. Out of the 11 companies having paid-up capital of Rs.1.00 to Rs.10.00 Crores, 4 companies had nil uncovered exposure, 7 had upto 50% uncovered exposure. Out of the 29 companies having paid-up share capital of more than Rs.10.00 Crores, 6 had nil uncovered exposure, 11 upto 25% uncovered exposure, 7 upto 50% uncovered exposure, 2 upto 75% uncovered exposure and 3 upto 100% uncovered exposure.

Chart - 6.18(b) Paid-up Share Capital and Uncovered Exposure



6.8 Views expressed by CFOs of Companies, Bankers and Regulators

Based on our interactions with corporate Chief Financial Officers, Bankers and Regulators, we give below their views: -

The foreign exchange derivative products that are available in the Indian financial markets are forwards, options and currency swaps. A detailed look at these products is given below: -

Rupee forwards

An important segment of the foreign exchange derivatives market in India is the Rupee forward contract. This market is growing rapidly with an increased participation from the corporates and banks. Till February 1992, forward contracts were permitted only against trade related exposures and these contracts could not be cancelled except where the underlying transactions failed to materialize. In March 1992, in order to provide operational freedom to corporates unrestricted booking and cancellation of forward contracts for all genuine exposures, whether trade related or not were permitted. Due to the Asian currency crisis, this freedom to rebook cancelled contracts was suspended in 1998, which has been relaxed for the exporters in 2002 and for the importers in 2004.

The liquidity in the Indian forward market has been steadily improving and the bid-offer spread has been decreasing considerably with the increase in turn over in the forward market. The forward market in our country was active only upto 6 months, where two-way quotes were available. With the initiative of RBI, the maturity profile has elongated and quotes are now available upto one year. But the liquidity of this segment needs to improve. Understandably in most markets, where there are restrictions on capital movements, liquidity across the spectrum as seen in the developed markets, proves to be difficult in early stages of development of the market.

The liquidity in the Indian forwards market is mainly for the end of the month maturity contracts, where the bid-offer spread is low. Standard maturity contracts like for three months and six months are not quoted in the inter bank markets. Hence, the cost of entering into a standard maturity contract is much higher as compared to a month end contract.

The Indian forward market is relatively illiquid for the standard maturity contracts as most of the contracts are for the month ends only. One of the reasons for the market makers' reluctance to offer these standard contracts could be the absence of a well-developed term money market. The market makers feel that given the future like nature of Indian forward market, currency futures could be allowed. Some of the benefits that may be provided by the futures are as follows: -

(a) Currency futures, since they are traded on organized exchanges, also confer benefits from concentrating order flow and providing a transparent venue for price discovery, while over-the-counter forward contracts rely on bilateral negotiations.

(b) Two characteristics of futures contract – their minimal margin requirements and low transaction cost relative to the over-the-counter markets strengthen the case for their introduction.

(c) Credit risks are further mitigated by daily marking to market of all future positions with gains and losses paid by each participant to the clearinghouse by the end of the trading session.

(d) Future contracts are standardized using the same delivery dates and the same nominal amount of currency units to be traded.

Currency options

The Reserve Bank of India has permitted authorized dealers to offer cross currency options and Rupee currency options to the corporate clients. Cross currency options provide a way of availing of the upside from any currency exposure while being protected from the downside on payment of an upfront premium. The corporates feel the option premium is currently very high and the spread is very wide. Minimum size of the contract is also high at quarter million Dollars. At present, activity in this product is limited as these are early days of introduction of this product. Increased activity in options can result as the corporates start understanding this product better.

Currency Swaps

Another spin-off of the financial reforms and liberalization is the introduction of foreign currency to Rupee swaps. Initially, the market was very small and the two-way quotes were very wide. The market started developing as more players as well as corporates started understanding this product and using them to manage their exposures. Corporates started using swaps for hedging their currency exposure and to reduce their borrowing cost. RBI tried to regulate the market by fixing USD 10 million as the limit for open position on the swap book for the authorized dealers. This was raised to USD 25 million and then to USD 50 million. The authorized dealers were also allowed the use of currency swaps to hedge their asset-liability portfolio. These developments are expected to result in increased market activity. The corporates feel the international swap dealers' association agreement that they have to sign with the Authorized Dealers is too confusing, lengthy and has lot of irrelevant clauses. This agreement needs to be made user-friendly for the corporates.

6.9 Case Study – 1 : Infosys Technologies Limited - Corporate Risk Management

Introduction

"One cannot manage change, One can only be ahead of it"

- Peter Drucker

"Progress always involves risk; you can't steal second base and keep your foot on first base"

- Fredrick B Wilcox

Infosys Technologies: An Exemplar Intangible-Intensive Company

Infosys was set up in July 1981 by Mr. Narayana Murthy and his associates who shared a dream of building a world class IT services organisation. Infosys has emerged as a leading global IT services company, headquartered in Bangalore, India, with a turnover in excess of $1 billion in 2003-04. It provides end-to-end business solutions that leverage technology to enable their clients to enhance business performance. Its solutions span the entire software life cycle encompassing consulting, design, development, re-engineering, maintenance, systems integration, package evaluation, and maintenance.

Infosys has become an icon of modern India, its achievements are nonpareil. No company in India has won so many laurels and awards for its multi-faceted accomplishments in so short a time.

A List of select Awards Received by Infosys Technologies during the year 2002-03

- Ranked the best employer in India by Business Today – Hewlett in their annual survey.
- Ranked as the Best Managed Company in India by Asia Money.
- Received the best Annual Report award of the Institute of Chartered Accountants of India for the seventh successive year.
- Ranked No.1 among Asia's leading companies in India by Far Eastern Economic Review
- Rated the most globally competitive company,
- Rated the most globally competitive company, most dynamic company, most ethical company and best IT company by Business World.

Stellar Performance

Set up in July 1981 with a nominal capital of Rs.10,000, Infosys has achieved phenomenal growth in revenues, profit, and market capitalization over time. Selective financial data is given below for four years, viz., 1981-1982 (the first year of the company's existence), 1993-94 (the year after the company made its IPO), 2002-03 and 2003-04 (the last two financial years).

Rs. in crore

	1981-82	1993-94	2002-03	2003-04
Revenues	0.12	28.90	3622.69	4760.89
Profit after tax from ordinary activities	0.04	8.09	957.93	1243.47
Net Worth	0.16	28.70	2860.67	3253.43
Market capitalization		191.02	26847.33	32908.69

From the above data we find that:

- The CAGR in revenues and profit over 22 years (1981-82 to 2003-04) was 62 percent and 60 percent respectively.
- The CAGR in market capitalization over 10 years (1993-94 to 2003-04) was 67 percent.
- The market value added at the end of 2002-03 was Rs.23986.66 crores and Rs.29655.26 at the end of 2003-04.

Thanks to such sterling performance and to the attractive pricing of the IPO made in March 1993, investors who participated in the IPO of the company earned spectacular returns. An investment of Rs.95 in one share in March 1993 appreciated to Rs.92,800 by August 2004, thanks to three 1:1 bonus issues in 1993, 1997, and 1999 and one 2:1 stock split in 2000 and a three for one share held bonus issue in 2004. One share in 1993 became 64 shares in 2004. An appreciation of Rs.95 to Rs.92,800 over an eleven year period means a compounded annual rate of growth of 86.98 percent. There is perhaps no parallel to this in Indian capital market history.

Drivers of Performance

The outstanding performance of Infosys may be attributed to a number of factors. The more important ones are described briefly below:

Mature Global Delivery Model

Infosys has pioneered and perfected the off shore development model which is very attractive to its clients who are primarily located in the United States, Europe, and Japan.

The advantages of the off shore development model are: (a) A 24-hour work schedule that takes advantage of time zone differences between development centers in India and client sites. (b) Access to a large pool of highly skilled English-speaking IT professionals in India, available at a relatively low cost. (c) The ability to accelerate the delivery time of large projects by parallel processing of different phases of a project's development. (d) Physical and operational separation from all other client projects, providing enhanced security for a client's intellectual property.

Deep Client Relationships

Infosys is sharply focused on the needs and preferences of its customers. Their track records of delivering high quality solutions across the entire software cycle and its strong industry expertise have strengthened its relationships with large multi-national corporations.

Sound Systems and Processes

Infosys has laid a lot of emphasis on developing sound systems and processes in various areas such as marketing, project management, delivery, quality, human resources, finance, and technical support.

Infosys has been successfully assessed at Level 5 of the Integrated Capability Maturity Model (SEI – CMMI) developed by the Software Engineering Institute (SEI) at Carnegie Mellon University, USA. This is a reflection of the maturity and effectiveness of its software processes. The company has also been assessed at Level 5 of the People Capability Maturity Model (PCMM), a testimony to the strong process orientation in its human resources management.

Conducive Work Environment

Since the success of Infosys depends on its ability to attract and retain highly talented IT professionals, Infosys pays considerable attention to creating a quality work environment, imparting training, providing challenging assignments, fostering a congenial atmosphere and informal culture, and encouraging free flow of ideas.

Infosys has displayed remarkable foresight in introducing one of the most comprehensive stock option plans in India. The plan has been a very effective instrument to motivate employees, provide long-term incentives for value creation, and induce a sense of ownership among employees.

Integrated Performance Management

Infosys has an integrated performance management system that sets challenging targets, facilitates objective-driven appraisal, and links the variable component of the compensation package to individual unit and company performance. All this fosters a culture of high performance work ethic.

Comprehensive Risk Management

Infosys has a very comprehensive approach to risk management. The thrust of its risk management practice is to prevent undue concentration of revenues in any one service, client, industry, or geography, hedge against exchange rate risk, eschew debt, maintain strong liquidity, comply with all legal and statutory requirements, develop strong processes and systems, install proper

financial responsibility, and ensure disaster recovery and business continuity plans for all the operations.

Evolved Corporate Governance

Infosys firmly believes in aligning the interest of managers with shareholders, complying with the laws in all countries in which it operates. The Annual Report of Infosys provides a wealth of information, much beyond what is required statutorily.

Favourable Tax Environment

Infosys has benefited from a variety of tax incentives given to software firms in India. These include relief from import duties on hardware, a tax exemption for income derived from software, and tax holidays provided for companies operating in specially designed "Software Technology Parks".

Management: The Key Force

Infosys has set an inspiring vision, pursued a well-created strategy of levering on the off shore development model, raised capital economically, invested judiciously in infrastructure, technology, systems, processes, human resources, and brand development, established an effective approach to performance management, managed growth effectively, developed a sound risk management system, and communicated superbly with investors.

The outstanding leadership and management of the firm who take a balanced approach to the multiple facets of business have driven all this. The cohesive leadership provided by the founders who strongly share certain values and aspirations, the caliber and talent of its management team, the pattern of ownership and control and the organizational architecture that instills a value orientation seem to be the foundation for the outstanding performance of this jewel of modern India.

Summary

- The terms knowledge assets, intellectual capital, and intangible assets are used interchangeably. Economists call them knowledge assets; management experts refer to them as intellectual capital and accountants call them intangible assets or simply intangibles.

- Firms in sectors such as information technology, biotechnology, pharmaceuticals, and fast moving consumer goods seem to be more intangible asset intensive whereas firms in sectors such as oil, automobiles, and consumer durables are more tangible asset intensive.

- The important characteristics or features of intangible assets or intangible-intensive firms are as follows: (a) Intangible assets are, in general, non-rival in nature. (b) Intangible assets have hazy property rights. (c) The investment in intangibles is inherently very risky. (d) Intangibles do not generally have organized and competitive markets. (e) A very large portion of the value of an intangible-intensive firm is accounted for by the future growth value.

- The implications of an intangible-intensive business for financial management are as follows: (a) An intangible-intensive business is a high risk-high return proposition. (b) To ensure that an intangible-intensive firm delivers on its growth expectation, its organizational architecture must promote decentralization, encourage cooperative endeavour, and sharpen accountability (c) An intangible-intensive firm has to rely primarily on equity financing. (d) Meaningful investor communication is very important for an intangible-intensive firm.

- The most important types of intangible assets are: brands, publishing rights, intellectual property, and licenses.

- There are three board approaches to valuing an intangible asset: cost approach, market approach and economic approach. Out of these, the economic approach is the most widely used. It involves estimating the cash flows/earnings associated with the intangible assets and capitalizing the same.

- The outstanding performance of Infosys Technologies Limited may be attributed to a number of factors such as a mature global delivery model, deep client relationships, sound systems and processes, conducive work performance, integrated performance management, comprehensive risk management, evolved corporate governance, and favourable tax environment. The prime force behind these factors has been the outstanding leadership and management of the firm.

The Information Technology (IT) business has several inherent risks, including a dynamic and rapidly changing environment. The evident impact of the challenging environment on businesses, over the past few years, bears testimony to this. It is indeed during such times that a company's ability to manage risk is put to test. Infosys has performed better than estimates and industry growth rates, even during these tough times.

Infosys' business model is based on four vital elements – Predictability, Sustainability, Profitability and De-risking, which we refer to as our PSPD model. The model helps the management analyze the risk-return trade-off and effectively evaluate strategic options. In this context, Infosys' performance can be attributed, in a significant measure, to its resilient business model and its prudent risk management practices.

Risk management structure

The audit committee of the board provides the overall direction on the risk management policies of the company. The board of directors is responsible for monitoring risk levels on various parameters and the management council ensures implementation of mitigation measures. The disclosure committee monitors the risks periodically. The risk management structure is designed to cascade to the line managers so that risks at the transactional level are identified and steps are taken to mitigate risk in a decentralized manner.

Risk management framework

A comprehensive and integrated risk management framework forms the basis of all the de-risking efforts of the company. Prudential norms aimed at limiting exposure are an integral part of this framework. Formal reporting and control mechanisms ensure timely availability of information and facilitate proactive risk management. The framework seeks to address the following risks that management believes can be actively addressed through corporate action.

Environment and market	Organization management	
1.Macroeconomic factors 2.Competition 3.Concentration of revenues 3.1 Service offerings 3.2 Clients 3.3 Industry 3.4 Geography 4. Political environment	5. Finance 5.1 Exchange rates 5.2 Liquidity 5.3 Leverage 6. Regulatory and legal compliance 6.1 Contractual commitments 6.2 Statutory compliance 6.3 Conformity with local laws 6.4 Intellectual property 6.5 Immigration	7. Systems and Processes 7.1 Leadership development 7.2 Human resource management 7.3 Process and project management 7.4 Internal control systems 7.5 Security and business continuity 7.6 Currency of technology

Infosys has insured itself against various types of risks. This includes key insurance cover for Directors and Officers (D&O) and cover for professional Errors and Omissions (E&O). Further, the company has full insurance cover for its entire physical infrastructure. In addition, they have protected their fixed costs and have covered against loss of profits. They have also insured against other contingencies including coverage for lives of all employees in India and abroad, and accident cover for employees.

Infosys has always sought a comprehensive view to risk management to address risks inherent to strategy, operations, finance and compliance, and their resulting organizational impact. Over the last fiscal, Infosys made improvements in its risk management processes at the corporate level, within the business units and made progress in extending the same to its subsidiary organizations. This holistic approach provides the assurance that, to the best of its capabilities, the organization and all its performing units are identifying,

assessing and mitigating risks that could materially impact its performance towards the stated objectives.

Exchange rate fluctuations

Functional currency of Infosys is the Indian Rupee (except for Infosys, Australia and Infosys, China), although a major portion of business is transacted in foreign currencies. Last fiscal, Infosys derived its revenues from 39 countries of which 84.9% were US $ denominated and majority of the company's expenses were in the Indian Rupee. The exchange rate between the rupee and the dollar has been changing substantially, and the company faces the risks associated with exchange rate fluctuations and translation effect, wherein the appreciation of the rupee against foreign currency adversely impacts its profitability and operating results.

Infosys' risk management policy ensures that expenses in local currency are met through receipts in the same currency. The company seeks to reduce the effect of exchange rate fluctuations on operating results by purchasing foreign exchange forward contracts to cover a portion of outstanding accounts receivable. Contracts in non-US and non-EU regions are in internationally tradable currencies so that the company is not exposed to local currencies that may have non-tradability risks. The company does not take active trading positions in foreign currency markets and operates only to hedge against appreciation of rupee during the year.

Financial reporting risks

The US Sarbanes-Oxley Act of 2002, ushered in after the various financial reporting debacles in previous 24 months, has served to herald a new era in corporate governance enforcement. The CEO and CFO responsibilities, as outlined in the Act, seek to make the officers of the company `serve and protect' shareholder interests in the companies that they run. Recognizing the concerns the Act seeks to address, the Company's directors sought early adoption of several of the Act's requirements, well before the prescribed mandatory applicability dates in fiscal – 2006.

The company prepares financial statements in conformity with the US GAAP. This requires estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities on the date of the financial statements, and the reported amounts of revenues and expenses during the financial reporting period. These estimates and assumptions are made based on judgments about carrying values of assets and liabilities, which carry inherent reporting risks. Here, the accounting policies related to revenue recognition and income tax deserve special attention.

Change in Hedging Strategy

The company's revenue recognition norms have been evaluated by experts and have been deployed through the company's processes and systems. Based on the evaluation of income-tax position and the information presently available, the company has adequately covered for probable exposures as of March 31, 2004.

The Rupee's depreciation in the June quarter of 2004 has prompted Infosys to change its hedging strategy and the Company is marking to market its outstanding positions according to Chief Financial Officer and Director (Finance), Mr T V Mohandas Pai. He admitted that the Rupee's depreciation had taken Infosys by surprise. "Fortunately, we did not have large positions outstanding at the year-end March 2004. In the Indian GAAP (Generally Accepted Accounting Principles) for June 2004, we have marked to market the entire position of $228 million", he said.

He added, "When you mark to market, because you have sold it forward at the lower rate, you have taken the loss. That loss has been input into the accounts. All the losses on the forward cover have been marked to market, at 45.99 to the dollar.

Infosys is "cautious" on the Rupee at the moment. "We are cautious right now, but we shall look at the markets and make sure our hedging policy actually works. We need to reconfigure our policy and take appropriate steps", he said.

Source: (1) Annual Report – 2003 - 04 – Infosys.
(2) www.moneycontrol.com

6.10 Case Study – 2: Orchid Pharmaceuticals &Chemicals Limited

About orchid:

Orchid Chemicals & Pharmaceuticals Ltd. is a leading pharmaceutical company headquartered in Chennai, India involved in the manufacture of cephalosporin and non-cephalosporin bulk actives, formulations and nutraceuticals. With exports spanning more than 75 countries, Orchid is the largest manufacturer-exporter of cephalosporin bulk actives in India and is ranked amongst the Top 5-cephalosporin producers in the world.

A first generation enterprise founded in 1992 by K Raghavendra Rao, Orchid has been recognized as the only company in the Indian Pharmaceutical industry to record remarkable growth in less than a decade of inception.

Manufacturing facilities:

Orchid's world-class manufacturing facilities for bulk actives, including the latest USFDA compliant facilities, are located in Alathur, a little away from Chennai and in Aurangabad, near Mumbai. Orchid also has dedicated manufacturing facilities for nutraceutical bulk active ingredients and formulations in Alathur. Orchid's R&D facility located at Sholinganallur in Chennai is considered among the most advanced and state-of-the-art center for applied research and analytical development. It also houses the newly commissioned New Drug Discovery infrastructure and a world-class pre-clinical toxicology and pharmacology center.

Orchid has undertaken several initiatives to position itself strategically in the evolving global pharmaceutical paradigm. From a core competence in manufacture of cephalosporin bulk drugs, Orchid has evolved into a composite pharmaceutical company that has distinctly moved up the pharmaceutical value chain.

Management:

Orchid acknowledges the fact that apart from its world-class infrastructure and technology enhancements, the most valuable resource is its human asset. It is the dedication of its people that has helped Orchid transform its dreams and ambitions into realities and achievements.

The Orchid family is now 3000 strong (together with and including all divisions) comprising of professionals handpicked from different faculties handling an array of diverse operations ranging from R&D, process development, production and quality to effluent treatment, utilities, maintenance, safety, environment and health.

Similarly, experienced professionals steer crucial operational aspects like marketing, accounts, finance and human resources together with engineering and other operational areas.

The core management team (CMT) responsible for formulating the company's growth strategies comprises of innovative, entrepreneurial, and collaborative senior management members led by the Founder and Managing Director and are responsible for building Orchid from a blueprint project to its current global leadership position.

Collectively, Orchid's team has built the company into a highly respectable and admired player in the global Pharmaceutical industry.

Recognition:

- CEU Award for Excellence in Exports - Drugs & Pharmaceutical.
- Trophy for meritorious performance – Exports.
- First Award for Exports.
- Industrial Economist Business Excellence Award.
- Entrepreneur of the year Award - Manufacturing 1999.
- Dynamic Entrepreneur of the Year Award.
- Indian Express Young India Business Achiever Award.

Regulated markets:

Entry into the regulated markets of Europe and US is a key component of the Company's business strategy. The new manufacturing facilities for oral and sterile cephalosporin bulk drugs, designed for US FDA compliance, were commissioned during the last quarter of the year under review. The state-of - the-art formulations plant for oral and sterile cephalosporins is also fast nearing completion at Irungattukottai, near Chennai. With this, Orchid will have unique end-to-end connectivity for servicing the regulated market requirements.

During the year under review, the Company received US FDA certification for its flagship product, Cephalexin. Exports of this product to the US market have commenced this fiscal. The Company has a structured plan for regulatory submissions, inspections and approvals, which will enable a major, thrust into advanced markets in the future years.

Simultaneously, the Company has stepped up efforts to expand into Europe. Orchid has three Certificates of Suitability (CoS) from the European Directorate of Quality Medicines (EDQM), including the latest CoS received for its premium molecule Cefuroxime Axetil. Even as more CoS filings are in

the pipeline; an inspection by the EDQM of the facilities was done in September 2003..

Business mission:

The Active Pharma Ingredients (API) business has taken up for itself three-business missions:

- Achieve a major increase in production and sales through new facilities and de- bottlenecking.
- Achieve cost compression through sustained focus on process efficiency, yield improvement & solvent recovery.
- Achieve US FDA certification for all key products, based on new as well as existing facilities.

Similarly, the formulation business is anchored around three critical business missions.

- Achieve a viable, self- sustaining business in domestic and export formulations markets.
- Become a co – marketer of choice for select strategic partners.
- Lead the US generics effort through the state of art formulations plant and series of ANDAs.

The drug discovery & drug delivery missions are to

- Develop lead molecules in each of the chosen therapeutic classes through phase I and phase II proof of concept human clinical studies.
- Develop novel drug delivery systems for the chosen cephalosporin molecules.
- Position the drug discovery and delivery infrastructure in the global research scenario for strategic partnerships.

Future outlook:

As a result of the various initiatives undertaken over the last two years, Orchid is poised to enter a new era of growth and profitability. Future growth drivers of Orchid will be in terms of entry into the US antibiotics generics business, diversified formulations growth covering both domestic and non-regulated markets and potential discovery of new drugs by Orchid and its US joint venture.

These coupled with the manufacturing joint venture in China and focused thrust on Russia and Brazil would significantly reinforce Orchid's position in the global pharmaceutical industry. Orchid expects robust performance growth in the years to come as a result of the multi-pronged business strategy.

Corporate risk management policy:

The risk management posture differs from company to company. Some companies follow active strategy, some may be passive or conservative and some may be risk neutral.

In active strategy the risk management center is a profit center. Such profits arise out of active currency trading and have little to do with the core business.

If a company wishes to be neither hurt nor benefit from the financial market fluctuations, then the company has a passive approach to risk management. They hedge exposure 100% as and when they arise.

There are some firms that are risk neutral and they follow a selective hedging approach. That is, they hedge when the rates are attractive, and leave the exposure if the rates are not attractive.

Orchid belongs to the third category. They are risk neutral. They entered in to a swap deal on 11.09.2002 with ABN-AMRO Bank for a one-year maturity converting 800 million rupees into US dollars @ Rs.48,52 per dollar at an interest rate of 9.78% when the rupee loan was taken at 12.5% from IDBI. On 23.05.2003, this deal was closed at a rupee-dollar rate of Rs.47.42. The Rupee interest plus principal repayment was 900,000,000.00. But the actual cash outflow was 871,282,231.38 on account of the swap deal. This deal resulted in a profit of nearly Rs.2.87 crores for Orchid. In September 2003, the rupee reached the level of Rs.46. If Orchid had continued this transaction till September 2003, the expected gain for the company could have been nearly Rs.5.63 crores. This is an opportunity loss for the company. The details of the swap deal are given in Table – 6.19 & 6.20 below:

Table - 6.19 Orchid's deal with ABN-AMRO Bank from 11.09.2002 to 23.05.2003

INR PRINCIPAL	800,000,000.00
INR/USD	48.52
USD PRINCIPAL	16,488,046.17
INR ROI	12.50%
USD ROI	9.78%
INR INTEREST	100,000,000.00
FRA FOR MATURITY	1.50000%
TOTAL USD ROI	11.28%
USD INT.	1,885,682.88
TOTAL P + I	18,373,729.05
TOTAL USD = INR	47.42
TOTAL OUTFLOW	871,282,231.38
TOTAL INFLOW	900,000,000.00
NETT FLOW	28,717,768.62

Table - 6.20: Orchid's deal with ABN-AMRO Bank from 11.09.2002 to actual date of maturity 11.09.2003

Proposed for Maturity	
INR PRINCIPAL	800,000,000.00
INR/USD	48.52
USD PRINCIPAL	16,488,046.17
INR ROI	12.50%
USD ROI	9.78%
INR INTEREST	100,000,000.00
FRA FOR MATURITY	1.30%
TOTAL USD ROI	11.08%
USD INT.	1,852,248.79
TOTAL P + I	18,340,294.95
TOTAL USD = INR	46.00
TOTAL OUTFLOW	843,653,567.83
TOTAL INFLOW	900,000,000.00
NETT FLOW	56,346,432.17

Source: 1. Annual Report – 2003–04: Orchid.
3. Personal Interviews with Company Managers.

6.11 Summary of the cases

Case Study 1: Infosys Technologies Limited has a very good risk management structure. Inspite of their very good risk management framework, the Rupee's sudden depreciation in the June quarter caught them by surprise and they had to change their hedging strategy. Infosys had covered their June quarter receivables through forward contracts around the March 2004 rate of Rs.43.40 per US Dollar. They had to book losses on the forward cover by marking to market the forward cover contracts at the rate of Rs.45.99 to the Dollar for the entire position of $228 millions as the Rupee started depreciating from the March, 2004 level of 43.40 to 45.99 by June, 2004.

Case Study 2: Orchid Pharmaceuticals and Chemicals Limited belongs to the risk neutral category and it follows a selective hedging approach to its foreign exchange risk management. They entered in to a swap deal on 11th September 2002 with ABN-AMRO Bank for a one-year maturity converting 800 million rupees into US dollars @ Rs.48.52 per dollar at an interest rate of 9.78% when the rupee loan was taken at 12.5% from IDBI. On 23rd May 2003, this deal was closed at a rupee-dollar rate of Rs.47.42. The Rupee interest plus principal repayment was Rs.900,000,000.00. But the actual cash outflow was Rs.871,282,231.38 on account of the swap deal. This deal resulted in a profit of nearly Rs.2.87 crores for Orchid. In September 2003, the rupee reached the level of Rs.46. If Orchid had continued this transaction till September 2003, the expected gain for the company could have been nearly Rs.5.63 crores. This is an opportunity loss for the company.

In both cases, the opportunity loss was due to the inability of the companies to forecast the exchange rates.

6.12 Summary of the questionnaire based survey findings

The survey reports the results of the empirical study into the foreign exchange risk management practices of 54 responding companies. Of the 125 companies that were addressed, a total of 54 responded to the questionnaire. The managers of these companies were asked about the mode of exposure to

foreign exchange, about their risk management strategies, the risk management products that they were using and their reasons for using the same and if they were not using a particular product, their reasons for not using the same. The managers were asked to quantify their uncovered exposure. They were also asked how they forecast the exchange rate. The results can be summarized as follows:

(i) Most of the firms (51.9%) had exposure to foreign currency on account of all of imports, exports and foreign currency loans.

(ii) A sizeable majority of the firms (83.3%) adopted a selective hedging strategy based on case-to-case and time-to-time decisions.

(iii) Overwhelming majority of the companies (92.6%) did not forecast exchange rates on their own. About 77.8% of the responding companies relied on bankers' opinion and experts' opinion for taking a view on the exchange rates.

(iv) Only a small minority of firms (5.6%) does not hedge its foreign exchange risks and only a few companies (27.8%) hedge their exposure completely.

(v) A majority of the corporate managers (85.2%) feels that the exchange rates will move in the range of Rs.45 to Rs.46.5 per Dollar upto March 2005.

The companies cited the following reasons for using forwards for hedging their foreign exchange exposure:-

(1) Simple and easy to understand
(2) Liquid and available all the time
(3) Transparent
(4) Cost effective
(5) Useful in targeting a budgeted cost

The companies cited the following reasons for using options for hedging their foreign exchange exposure:-

(1) Strike price and premium are attractive
(2) Flexible with room to manoeuvre
(3) Gives right without obligation
(4) Liquid and available

The companies cited the following reasons for not using options for hedging their foreign exchange exposure: -

(1) Option premium is high
(2) Minimum contract size is high
(3) Companies are not yet comfortable with the product
(4) Fear of manipulation
(5) Option quotes favour the banks only
(6) Absence of dynamic quotations

The companies cited the following reasons for using swaps for hedging their foreign exchange exposure: -

(1) Interest rate reduction
(2) Cost effective
(3) Transparent

The companies cited the following reasons for not using swaps for hedging their foreign exchange exposure: -

(1) The international swap dealers association agreement is too confusing
(2) The agreement has irrelevant clauses
(3) It is too lengthy

6.13 Summary of the views expressed by Corporate Chief Finance Officers, Bankers and Regulators

The Indian foreign exchange derivatives market is still in a nascent stage of development but offers tremendous growth potential. The development of a vibrant foreign exchange derivatives market in India would critically depend on the growth in the underlying spot/forward markets, growth in the Rupee derivative markets along with the evolution of a supporting regulatory

structure. Factors such as market liquidity, corporate investor behaviour, regulatory structure and tax laws will have a heavy bearing on the behaviour of market variables in this market. Increased convertibility on the capital account would accelerate the process of integration of Indian financial markets with international markets. Some of the necessary preconditions to this as suggested by the Tarapore Committee are already met. Introduction of derivative products tailored to specific corporate requirements would enable corporates to completely focus on their core businesses, de-risking the currency and interest rate risks while allowing them to gain from the financial markets. Increased convertibility on the Rupee and regulatory impetus for new products should see a host of innovative products and structures tailored to business needs. The possibilities are many and include currency futures, Rupee forward rate agreements, Rupee and cross currency swaptions as well as structures composed of the above to address the needs of corporates. A further development in the derivatives market could also see derivative products linked to commodities, weather, etc., which would add great value in an economy where substantial section is still agrarian and dependent on the vagaries of the monsoon.

CHAPTER - 7

SUMMARY AND CONCLUSIONS

This chapter highlights the conclusion of the study and the recommendations that are put-forward. For this purpose, the following scheme of presentation of this chapter has been adopted.

(i) Conclusions related with the recommendations of Tarapore Committee on Capital Account Convertibility, its sequencing and present status of implementation in India.

(ii) Identification of macroeconomic factors affecting the exchange rate of the Rupee against the Dollar.

(iii) Exchange rate volatility and its forecasting

(iv) Implications of exchange rate management for Indian companies

7.1 Summary of major pre-Conditions of Tarapore Committee and the current position as of November 2004

1. Gross fiscal deficit to GDP ratio to come down from a budgeted 4.5% in 1997-98 to 3.5% in 1999-2000. In November 2004, it was still at 5%.

2. A consolidated sinking fund has to be set up to meet the Government's debt repayment needs; to be financed by the increases in RBI's profit transfer to the Government and disinvestments proceeds. As of now, it is not yet done. Fiscal Responsibility Act, 2003 has been passed to reduce government's borrowings.

3. Transparent and globally comparable procedures for fiscal accounting need to be implemented.

4. Inflation rate should remain between an average 3.5% for the three-year period 1997-2000. It was around 7.5% in November 2004.

5. Gross NPAs of the public sector banking system needs to be brought down from the present 13.7% to 5% by 2000 and at the same time, average effective CRR needs to be brought down from the 10% level to 3% level. The Gross NPAs to advances of public sector banks as of 2003 are at 9.4% and Gross NPAs to total assets of the public sector banks are at 4.2%. The net NPAs to total advances of public sector banks as of 2003 are at 4.5% and net NPAs to total assets of the public sector banks are at 1.9% (RBI Annual Report, 2003).

6. RBI should have a Monitoring Exchange Rate Band of plus/minus 5% around a neutral Real Effective Exchange Rate. RBI should be transparent about the changes in REER. Currently, RBI is tracking the REER, but it does not have any target rate in mind or any band within which the rates should move.

7. External sector policies should be designed to increase current receipts to GDP ratio and bring down the debt-servicing ratio from 25% to 20%. This has been achieved. Current receipts to GDP ratio is 18.7% and debt service ratio is at 14.7%.

8. Indicators should be used for evaluating adequacy of foreign exchange reserves to safeguard against any contingency. Plus law should prescribe a minimum net foreign asset to currency ratio of 40%. Currently, our foreign exchange reserves are about $126 billion as of November 2004 and they are quite adequate. Foreign asset to currency ratio is more than adequate at 130%.

7.2 Identification of Macroeconomic Factors affecting Exchange Rates

The Management of the external sector has been one of the success stories of India in the last decade. The country has completed the first step towards full-float of the Rupee by allowing Foreign Direct Investment and Foreign Institutional Investment and the investors can bring in and take out money from the country. The second stage of allowing companies and individuals to borrow and invest in Foreign Exchange has been initiated but not completed in full. The country has comfortable Foreign Exchange Reserves (126 billion Dollars as of November 2004) and a healthy Balance of Payments situation.

India needs to bring down the gross fiscal deficit to GDP Ratio from the present 5% to 3.5%. Inflation should be contained from the current 7.5% to 3.5%. GDP should grow consistently at a growth ratio of 8% to 10%. If the above are achieved, India will be ready for full convertibility of the capital account. Based on the recommendations made by the Tarapore Committee and the analysis made, the following 9 factors, which are very important for capital account convertibility and which have influence on the exchange rate of the Rupee against the Dollar are identified as the Balance of Payments position, Inflation, Bank rate, Fiscal deficit, Gross Domestic Product, Foreign Exchange Reserves, External Debt, Foreign Direct Investment and Foreign Institutional Investment and US Federal Interest Rate.

7.3 Exchange rate volatility

The daily exchange rates of the Rupee against the US Dollar from January 1973 to November 2004 were studied and it was found that the Rupee exchange rates have followed a linear depreciating trend from 1973 to June 2002. From July 2002, they have turned volatile. Monte Carlo simulation results show that the exchange rate of the Rupee against the Dollar is volatile and the rate is most likely to be in the range of Rs.44 per Dollar to Rs.47 per Dollar for the year ending March 2005.

7.4 Forecasting of Exchange Rate

1. The relationship between the exchange rate of the Rupee against the Dollar and the nine-macroeconomic variables identified on Capital Account Convertibility has been studied. The univariate analysis rejected the null hypothesis for eight out of nine variables. Hence, it was found that there is a relationship between bank rate, balance of payment, external debt, FDI and FII, Foreign Exchange Reserves, GDP, Gross Fiscal Deficit, Inflation and the exchange rate of the Rupee against the Dollar. Only in the case of US Federal Interest Rate and the Exchange Rate of the Rupee against the Dollar, the null hypothesis of no linear relationship between the two variables is accepted at 5% level of significance. However, it is significant at 8.55% level based on the "P" value given in the summary output. In other words, if we increase the level of significance to 8.55% then the null hypothesis is rejected and there is a relationship between the exchange rate of the Rupee against the Dollar and the US Federal Interest Rate.

2. Multivariate analysis has been used for all the nine macroeconomic variables and it was found that there is a very strong linear relationship between the dependent variable (exchange rate of Rupee against Dollar) and the nine independent variables (bank rate, balance of payment, external debt, FDI and FII, Foreign Exchange Reserves, GDP, Gross Fiscal Deficit, Inflation and US Federal Interest Rate). The statistical validity test ANOVA also overwhelmingly rejects the null hypothesis of no linear relationship between the dependent variable and the set of independent variables already mentioned above. Then six of the significant independent variables have been selected, using the "P" (Probability significance) value.

They are external debt, foreign exchange reserves, GDP, US Federal Interest Rate, Bank Rate and Gross Fiscal Deficit. Multivariate analysis using the six significant variables found that the results are equally good and the differences are only marginal in the correlation value, r^2 value and the adjusted r^2 value.

3. The forecast of the exchange rate of the Rupee against the Dollar based on all the nine variables using the above multivariate regression model comes to Rs.44.55 per Dollar for March 2005.

The forecast of the exchange rate of the Rupee against the Dollar based on the six significant variables using the multivariate regression model come to Rs.45.91 per Dollar for March 2005.

The forecast of the exchange rates based on time series regression analysis was made. It was found that this method of forecasting showed a linear depreciating trend even when the Rupee was appreciating and hence we found it to be not reliable.

The forecast of the exchange rates based on exponential smoothing method taking the monthly data and the yearly data was also made and it was found the forecast exchange rate per Dollar to be in the range of Rs.44.10 Per Dollar to Rs.44.17 per Dollar from December 2004 to March 2005.

The forecast of the exchange rate based on the monthly moving average method and the yearly moving average method was made and it is in the range of Rs.44.63 per Dollar to Rs.43.70 per Dollar.

Based on the various techniques of forecasting, the exchange rate of the Rupee against the Dollar is expected to be in the range of Rs.43.70 per Dollar to Rs.45.91 per Dollar during December 2004 to March 2005. The forecast rates vary due to the application of different methods of calculation.

7.5 Summary of the questionnaire based survey findings

The survey reports the results of the empirical study into the foreign exchange risk management practices of 54 responding companies. Of the 125 companies that were addressed, a total of 54 responded to the questionnaire. The managers of these companies were asked about the mode of exposure to foreign exchange, about their risk management strategies, the risk management techniques that they were using and their reasons for using the same and if they were not using a particular technique, their reasons for not using the same. The managers were asked to quantify their uncovered exposure. They were also asked how they forecast the exchange rate.

7.5.1 The results can be summarized as follows:

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2. A sizeable majority of the firms (83.3%) adopted a selective hedging strategy based on case-to-case and time-to-time decisions.

3. Overwhelming majority of the companies (92.6%) did not forecast exchange rates on their own. About 77.8% of the responding companies relied on bankers' opinion and experts' opinion for taking a view on the exchange rates.

4. Only a small minority of firms (5.6%) does not hedge its foreign exchange risks and only a few companies (27.8%) hedge their exposure completely.

5. A majority of the corporate managers (85.2%) feels that the exchange rates will move in the range of Rs.45 to Rs.46.5 per Dollar upto March 2005.

7.5.2 The companies cited the following reasons for using forwards for hedging their foreign exchange exposure:-

(1) Simple and easy to understand
(2) Liquid and available all the time
(3) Transparent
(4) Cost effective
(5) Useful in targeting a budgeted cost

7.5.3 The companies cited the following reasons for using options for hedging their foreign exchange exposure: -

(1) Strike price and premium are attractive
(2) Flexible with room to manoeuvre
(3) Gives right without obligation
(4) Liquid and available

7.5.4 The companies cited the following reasons for not using options for hedging their foreign exchange exposure: -

(1) Option premium is high
(2) Minimum contract size is high
(3) Companies are not yet comfortable with the product
(4) Fear of manipulation
(5) Option quotes favour the banks only
(6) Absence of dynamic quotations

7.5.5 The companies cited the following reasons for using swaps for hedging their foreign exchange exposure: -

(1) Interest rate reduction
(2) Cost effective
(3) Transparent

7.5.6 The companies cited the following reasons for not using swaps for hedging their foreign exchange exposure: -

(1) The international swap dealers association agreement is too confusing
(2) The agreement has irrelevant clauses
(3) It is too lengthy

7.6 Summary of the views expressed by Corporate Chief Finance Officers, Bankers and Regulators:

The foreign exchange derivative products that are available in the Indian financial markets are forwards, options and currency swaps.

Rupee forwards

An important segment of the foreign exchange derivatives market in India is the Rupee forward contract. This market is growing rapidly with an increased participation from the corporates and banks. Till February 1992, forward contracts were permitted only against trade related exposures and these contracts could not be cancelled except where the underlying transactions failed to materialize. In March 1992, in order to provide operational freedom to corporates, unrestricted booking and cancellation of forward contracts for all genuine exposures, whether trade related or not, were permitted. Due to the Asian currency crisis, this freedom to rebook the cancelled contracts was suspended in 1998, which has been relaxed for the exporters in 2002 and for importers in 2004.

The liquidity in the Indian forward market has been steadily improving and the bid-offer spread has been decreasing considerably with the increase in turn over in the forward market. The forward market in our country is active only upto 6 months, where two-way quotes are available. With the initiative of RBI, the maturity profile has elongated and quotes are now available upto one year. But the liquidity of this segment needs to improve. Understandably in most markets, where there are restrictions on capital movements, liquidity across the

spectrum as seen in the developed markets, proves to be difficult in early stages of development of the market.

The liquidity in the Indian forwards market is mainly for the end of the month maturity contracts, where the bid-offer spread is low. Standard maturity contracts like, for three months and six months, are not quoted in the inter bank markets. Hence, the cost of entering into a standard maturity contract is much higher as compared to a month end contract.

The Indian forward market is relatively illiquid for the standard maturity contracts as most of the contracts are for the month ends only. One of the reasons for the market makers' reluctance to offer these standard contracts could be the absence of a well-developed term money market. The market makers feel that given the future like nature of Indian forward market, currency futures could be allowed. Some of the benefits that may be provided by the futures are as follows: -

a) Currency futures, since they are traded on organized exchanges, also confer benefits from concentrating order flow and providing a transparent venue for price discovery, while over-the-counter forward contracts rely on bilateral negotiations.

b) Two characteristics of futures contract – their minimal margin requirements and low transaction cost relative to the over-the-counter markets strengthen the case for their introduction.

c) Credit risks are further mitigated by daily marking to market of all future positions with gains and losses paid by each participant to the clearinghouse by the end of the trading session.

d) Future contracts are standardized using the same delivery dates and the same nominal amount of currency units to be traded.

Currency options

The Reserve Bank of India has permitted authorized dealers to offer cross currency options and Rupee currency options to the corporate clients. Cross currency options provide a way of availing of the upside from any currency exposure while being protected from the downside on payment of an upfront premium. The corporates feel the option premium is currently very high and the spread is very wide. Minimum size of the contract is also high at quarter million Dollars. At present, activity in this product is limited as it is in its early stage of introduction. Increased activity in options can result as the corporates start understanding this product better.

Currency swaps

Another spin-off of the financial reforms and liberalization is the introduction of foreign currency to Rupee swaps. Initially, the market was very small and the two-way quotes were very wide. The market started developing as more players as well as corporates started understanding this product and using them to manage their exposures. Corporates started using swaps for hedging their currency exposure and to reduce their borrowing cost. RBI tried to regulate the market by fixing USD 10 million as the limit for open position on the swap book for the authorized dealers. This was raised to USD 25 million and then to USD 50 million. The authorized dealers were also allowed the use of currency swaps to hedge their asset-liability portfolio. These developments are expected to result in increased market activity. The corporates feel the international swap dealers' association agreement, which they have to sign with the Authorized Dealers, at the time of entering into a swap deal, is too confusing, lengthy and has lot of irrelevant clauses. This agreement needs to be made user-friendly for the corporates.

7.7 Summary of the cases

Case Study 1: Infosys Technologies Limited has a very good risk management structure. Inspite of their very good risk management framework, the Rupee's sudden depreciation in the quarter ending June 2004 caught them by surprise and they had to change their hedging strategy. Infosys had covered their June quarter end receivables through forward contracts around the March 2004 rate of Rs.43.40 per US Dollar. They had to book losses on the forward cover by marking to market the forward cover contracts at the rate of Rs.45.99 to the Dollar for the entire position of $228 millions as the Rupee started depreciating from the March, 2004 level of Rs.43.40 to Rs.45.99 by June, 2004.

Case Study 2: Orchid Pharmaceuticals and Chemicals Limited belongs to the risk neutral category and follows a selective hedging approach to their foreign exchange risk management. They entered in to a swap deal on 11th September 2002 with ABN-AMRO Bank for a one-year maturity converting 800 million rupees into US dollars @ Rs.48.52 per dollar at an interest rate of 9.78% when the rupee loan was taken at 12.5% from IDBI. On 23rd May 2003, this deal was closed at a rupee-dollar rate of Rs.47.42. The Rupee interest plus principal repayment was Rs.900,000,000.00. But the actual cash outflow was Rs.871,282,231.38 on account of the swap deal. This deal resulted in a profit of nearly Rs.2.87 crores for Orchid. In September 2003, the rupee reached the level of Rs.46. If Orchid had continued this transaction till September 2003, the expected gain for the company could have been nearly Rs.5.63 crores. This is an opportunity loss for the company.

In both cases, the opportunity loss was due to the inability of the companies to forecast the exchange rates.

7.8 Recommendations for the Companies

The study has amply demonstrated the volatility in the exchange rate of the Rupee against the Dollar. From January 1973 to June 2002, the Rupee depreciated steadily from the level of Rs.8.02 to a Dollar to Rs.49.07 to a Dollar. From June 2002, it appreciated steadily till March 2004 to a level of Rs.43.40. From April 2004 again it has started depreciating and reached a level of Rs.46.16 end of September 2004. By end of November 2004, it has again reached a level of Rs.44.75. From 2002 to 2004, there is lot of volatility in the exchange rate movement and the trend is no more unidirectional. This calls for forecasting of exchange rates with emphasis on various factors affecting the exchange rates and continuous monitoring of the exposure. Prior to the volatile phase in the exchange rates, corporates used to hedge their exposure on imports, interest payments and loan repayments and leave their export receivables un-hedged because of the unidirectional movement of the Rupee-Dollar exchange rates. The current scenario calls for active risk management on the part of the fund managers. They have to make effective use of currency forwards, currency options and swaps. These products are now freely available, thanks to the policy changes announced by the Reserve Bank of India. For effective use of these products, corporates need to forecast the exchange rates based on the macroeconomic factors that affect the rates. Based on the forecasting models and views from the corporate finance heads, bankers and regulators, we have arrived at a range of Rs.43.70 to Rs.45.91 for the Rupee – Dollar exchange rates for the year ending March 2005. Corporates should cover their export receivables at the higher end of the range (Rs.45.91) and cover their payables on account of imports, interest payments and repayment of loans at the lower end of the range (Rs.43.70). They should constantly watch the exchange rate movement and take the above steps when the opportunity presents itself.

7.9 Recommendations for the Regulators and the Government

The Indian foreign exchange derivatives market is still in a nascent stage of development but offers tremendous growth potential. The development of a vibrant foreign exchange derivatives market in India would critically depend on the growth in the underlying spot/forward markets, growth in the Rupee derivative markets along with the evolution of a supporting regulatory structure. Factors such as market liquidity, corporate investor behaviour, regulatory structure and tax laws will have a significant bearing on the behaviour of market variables in this market. Increased convertibility on the capital account would accelerate the process of integration of Indian financial markets with international markets. Some of the necessary preconditions to this, as suggested by the Tarapore Committee, are already met. Introduction of derivative products, tailored to specific corporate requirements, would enable corporates to completely focus on their core businesses, de-risking the currency and interest rate risks while allowing them to gain from the financial markets. Increased convertibility on the Rupee and regulatory impetus for new products should see a host of innovative products and structures tailored to business needs. The possibilities are many and include currency futures, Rupee forward rate agreements, Rupee and cross currency swaptions as well as structures composed of the above to address the needs of corporates. A further development in the derivatives market could also see derivative products linked to commodities, weather etc., which would add great value in an economy where substantial section is still agrarian and dependent on the vagaries of the monsoon.

7.10 Direction for future Research

This study has revealed interesting insights into the fascinating world of foreign exchange markets and exchange rate management. This study has taken only two currencies namely; the Rupee and the Dollar. Similar studies can be taken up against other currencies like Euro, Pound and Yen.

(i) With 31 countries adopting Euro as their national currency, it will be interesting to study the Euro – Dollar exchange rate behaviour in the immediate future.

(ii) This study is based on 54 companies, which are predominantly Chennai based. The scope of the study can be enlarged by taking sample Companies on an all India basis.

(iii) Conducting a focus group discussion involving CFOs that would shed light on certain important underlying dimensions can further delineate the study. These dimensions and their ramifications cannot be brought about by one to one discussion with experts because there is no interaction amongst experts. In the focus group discussion, the collective synergy of these experts will give rise to a number of useful hypotheses. These hypotheses could be tested at a macro level by conclusive studies. Needless to mention here that the audience for the focus group discussion must form a homogenous group and screened before they are invited for the discussion.

(iv) Advanced econometric models of forecasting could be undertaken by making available a large database. These models would include Box and Jenkin (Johnston, 1972; Greene, 2000; Ramu Ramanathan, 2002), ARIMA (Auto Regressive Moving Average) and Adaptive Filtering.

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Appendix 1

QUESTIONNAIRE

Name of the Company:

Name of the Person:

Designation:

1. Your exposure to foreign currency is on account of

   a) Imports
   b) Exports
   c) Foreign Currency Loans
   d) All the above

2. How do you manage this exposure?

   a) Aggressive (active management through treasury department)
   b) Passive (immediate forward cover)
   c) On a case to case and time to time basis

3. What risk management products you are using currently to manage your currency risk?

   a) Forwards
   b) Options
   c) Swaps
   d) All the above
   e) Forwards and Options
   f) Forwards and Swaps

4. If you are using forwards, please state the reasons for using forwards.

   a) It is simple and easy to understand
   b) It is liquid and available
   c) It is transparent
   d) It is cost effective
   e) Useful in targeting budgeted cost
   f) All the above
   g) Others

5. If you are using options, please give the reasons for using options.

a) Strike and premium is attractive
b) It is liquid and available
c) Flexible with room to manoeuvre
d) It is cost effective
e) Gives right without obligation
f) Any other reason
g) All the above
h) Not using

6. If you are using swaps, please give the reasons for using swaps.

a) It is simple and easy to understand
b) It is liquid and available
c) It is transparent
d) It is cost effective
e) Interest rate reduction
f) All the above
g) Not using

7. If you are not using forwards, please give reasons.

8. If you are not using options, please give reasons.

a) Premium is high
b) Minimum contract size is high
c) Fear of manipulation
d) Not yet comfortable with the product
e) Option quotes favour banks only
f) Absence of dynamic option quotes
g) All the above
h) Not applicable

9. If you are not using swaps, please give reasons.

a) ISDA agreement is too confusing
b) It has irrelevant clauses and difficult to read and understand
c) Not applicable

10. What percentage of your exposure mostly remains uncovered at any point of time?

    a) Nil
    b) Upto 25%
    c) Upto 50%
    d) Upto 75%
    e) Upto 100%

11. Are you forecasting exchange rates? If yes, how?

12. If you are not forecasting exchange rates, then do you rely on

    a) Bankers' opinion
    b) Experts' opinion
    c) Combination of both

13. What is your opinion on Rupee-Dollar movement by the end of March 2005?

14. Information about your company:

    a) Type of business
    b) Paid-up Capital

Thank you.